DOCUMENT RESUME

ED 138 582 SP 011 009

TITLE Health Education: Cancer Prevention and Control. Teacher's Training Manual.
INSTITUTION New York State Education Dept., Albany. Bureau of School Health Education and Services.; New York State Univ. System, Albany.
PUB DATE 76
NOTE 129p.; For related documents, see ED 133 308-10

EDRS PRICE MF-$0.83 HC-$7.35 Plus Postage.
DESCRIPTORS *Curriculum Guides; *Disease Control; *Health Education; *Health Guides; Prevention; Preventive Medicine; *Secondary Education; *Special Health Problems; Teaching Guides
IDENTIFIERS *Cancer

ABSTRACT

The aim of these curriculum materials is to provide (1) essential background information regarding the more common forms of cancer and (2) learning experiences that emphasize the acquisition of knowledge regarding the cause, prevention, and treatment of cancer. The materials will enable students to: (1) identify the seven danger signals of cancer; (2) distinguish between healthful and unhealthful behavior; (3) describe actions to take regarding early detection and treatment; (4) conclude that most forms of cancer can be prevented or cured, and many presently uncurable forms controlled; (5) distinguish between normal and abnormal cell activity; (6) describe the nature and known causes of cancer; (7) list the four most common and preventable forms of cancer; (8) make responsible health decisions regarding personal behavior that will result in the prevention or early detection of cancer; (9) appreciate the value of learning about cancer; and (10) describe the kinds of cancer research being conducted. The information is organized into three sections--basic cancer information, supplemental reading, and fact sheets. Appendixes include: instruction for breast self-examination and lists of periodicals, books, governmental agencies, sources of educational aids, pamphlets, and films. (MM)

Documents acquired by ERIC include many informal unpublished materials not available from other sources. ERIC makes every effort to obtain the best copy available. Nevertheless, items of marginal reproducibility are often encountered and this affects the quality of the microfiche and hardcopy reproductions ERIC makes available via the ERIC Document Reproduction Service (EDRS). EDRS is not responsible for the quality of the original document. Reproductions supplied by EDRS are the best that can be made from the original.

ED138582

HEALTH EDUCATION:
CANCER PREVENTION AND CONTROL

TEACHER'S TRAINING MANUAL

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

The University of the State of New York/THE STATE EDUCATION DEPARTMENT
Bureau of School Health Education and Services
Albany 12234
1976

SP011009

ED138582

HEALTH EDUCATION:
CANCER PREVENTION AND CONTROL

Teacher's Training Manual

The University of the State of New York/The State Education Department

Bureau of School Health Education and Services

1976

SP 011 029

THE UNIVERSITY OF THE STATE OF NEW YORK
Regents of The University (with years when terms expire)

1981	Theodore M. Black, A.B., Litt.D., LL.D., Pd.D., D.C.L., L.H.D., Chancellor	Sands Point
1987	Carl H. Pforzheimer, Jr., A.B., M.B.A., D.C.S., H.H.D., Vice Chancellor	Purchase
1978	Alexander J. Allan, Jr., LL.D., Litt.D.	Troy
1981	Joseph C. Indelicato, M.D., L.H.D.	Brooklyn
1986	Kenneth B. Clark, A.B., M.S., Ph.D., LL.D., L.H.D., D.Sc.	Hastings on Hudson
1983	Harold E. Newcomb, B.A.	Owego
1988	Williard A. Genrich, LL.B., L.H.D., LL.D.	Buffalo
1982	Emlyn I. Griffith, A.B., J.D.	Rome
1977	Genevieve S. Klein, B.S., M.A.	Bayside
1981	William Jovanovich, A.B., LL.D., Litt.D., L.H.D.	Briarcliff Manor
1983	Mary Alice Kendall, B.S.	Irondequoit
1984	Jorge L. Batista, B.A., J.D.	Bronx
1982	Louis E. Yavner, LL.B.	New York
1979	Laura B. Chodos, B.A., M.A.	Clifton Park
1980	Martin C. Barell, B.A., I.A., LL.B.	Great Neck

President of The University and Commissioner of Education
Ewald B. Nyquist

Executive Deputy Commissioner of Education
Gordon M. Ambach

Deputy Commissioner for Elementary, Secondary, and Continuing Education
Thomas D. Sheldon

Associate Commissioner for Educational Finance and Management Services
Stanley L. Raub

Coordinator, Office of District Organization, Health and Pupil Services
Leo Soucy

Director, Division of Health and Pupil Personnel Services
James W. Moore

Chief, Bureau of School Health Education and Services
Frances A. Bernstein

ACKNOWLEDGEMENTS

The Bureau of School Health Education and Services wishes to acknowledge the efforts and contributions of the many people who prepared this cancer curriculum guide. They are: Edwin A. Mirand, Ph.D., D.Sc., Roswell Park Memorial Institute, Association Institute Director and Professor; Albert E. Bedworth, New York State Department of Education, Associate in School Health Education; Sister Aloise Ann Zasowska, Ed.D., Niagara University, Dean, College of Nursing; Craig Johnson, Roswell Park Memorial Institute, Assistant in Cancer Education; Russell Sciandra, Roswell Park Memorial Institute, Public Cancer Educator; Elena Greco, Department of Medical Illustrations, Roswell Park Memorial Institute, Artist.

Also lending advice and critical commentary are: M. Stephen Piver, M.D., Roswell Park Memorial Institute, Associate Chief, Gynecology; Takuma Nemoto, M.D., Roswell Park Memorial Institute, Associate Chief, Breast Surgery; Alison Johansson, Roswell Park Memorial Institute, Public Cancer Educator; Holly Howe, Erie County Department of Health, Public Health Educator; Nicholas Mogavero, Buffalo Public Schools, Director of Health Education; Helen E. McLimans, R.N., School Nurse-Teacher (Retired); Nancy Grant, R.N., Public Health Nursing Services, Delaware County Health Department, Karl Oesterle, Roswell Park Memorial Institute, Audio-Visual Coordinator.

Finally, we are grateful to the New York State Division of the American Cancer Society, which, under the leadership of Charles F. McCabe, Director of Public Education, reviewed the resources sections for accuracy and completeness.

PREFACE

Cancer is the second leading cause of death for all ages in the United States. It is superseded only by cardiovascular disease in this regard.

Some forms of cancer can be prevented in most individuals by simply avoiding certain kinds of behavior which contribute to their development. For example, skin cancer is chiefly the result of overexposure to the sun's rays over a period of years.

Present research data indicate that the majority of cases of five common forms of cancer (skin, lung, breast, cervical and colon) can be prevented if each individual learns how to live healthfully, receives a periodic physical examination and seeks competent medical advice and treatment as soon as any abnormal growth is detected. This is most highly exemplified by two illustrations:

1. At least 75% of the cases of lung cancer could be prevented if people would merely not smoke cigarettes. The educational implications are obvious.

2. More than 90% of the cases of cervical cancer can be detected by a simple procedure called the Pap Test during the precancerous stages. Treatment is most successful at this time. It, therefore, is important that every woman become familiar with this procedure and be motivated to have a Pap Test each year.

Since the incidence of many forms of cancer continues to rise, especially breast, lung, and cervical cancer in women, it is imperative that immediate remedial action be taken to prevent cancer, intensify cancer research, expand programs for early detection, and improve treatment procedures and related health care. The key to reversing present trends is a well-informed populace who are motivated toward positive health behavior. Cancer education that is a planned, sequential component of a comprehensive health education program, taught by trained and qualified health educators, is the foundation upon which success in conquering this major killer will be achieved.

It has become essential for the schools to assume the responsibility for educating children and youth regarding what they can do as individuals to prevent the occurrence, and decrease mortality from cancer. Educational approaches should emphasize the acquisition of knowledge regarding the cause, prevention and treatment of cancer, and ways in which each person can change his or her lifestyle so that he or she is less likely to develop cancer.

The purpose of these curriculum materials is to provide the teacher with essential background information regarding the more common forms of cancer and the kinds of learning experiences in which students can become involved in order to assist them in developing the proper attitudes toward cancer and to acquire the intellectual skills for appropriate decision making regarding the promotion of their own health.

Educational Goals

Since most cancers can be prevented or cured if detected and treated [illegible] their early stages, and since these depend upon the responsible behavior of each individual, the chief aim of this guide is to provide cancer information and learning experiences that will result in each student being able to:

- Identify the seven danger signals of cancer

- Distinguish between healthful and unhealthful behavior.

- Describe actions she/he must take regarding early detection and treatment.

- Conclude that most forms of cancer can be prevented or cured, and many presently incurable forms controlled.

- Distinguish between normal and abnormal cell activity.

- Describe the nature and known causes of cancer.

- List the four most common and preventable forms of cancer.

- Make responsible health decisions regarding his/her behavior which will result in the prevention or early detection of cancer.

- Appreciate the value of learning about cancer.

- Describe the kinds of cancer research being conducted.

SPECIAL EDUCATIONAL GOALS FOR GRADES 10-12

Present to every girl before graduation a learning experience on the importance of the Pap Test in the control of cervical cancer, and a session giving instructions on how to examine her breasts.

Teach the "Seven Safeguards" against cancer:

1. Don't smoke cigarettes.
2. Avoid overexposure to the sun.
3. Monthly breast self-examination.
4. Regular oral examinations.
5. Pap Test once a year.
6. Annual procto after 40.
7. Annual health check-up.

Make available stop smoking clinics for those students who really need the incentive and assistance in quitting.

Arrange for all students to receive this unit on cancer education sometime during their stay in high school.

TABLE OF CONTENTS

Page

Acknowledgements iii
Preface iv
Educational Goals v
Special Educational Goals vi

PART I: BASIC CANCER INFORMATION

- Introduction 1
- Objectives of Cancer Education 5
- Intent and Use of the Cancer Curriculum Guides 6
- The Nature of Cancer 8
- Cancer Sites 12
- The Prevention of Cancer 17
- Cancer Treatment 19
- General Cancer Research 21
- Rehabilitation of the Cancer Patient 23
- The Economics of Cancer 25
- Cancer's Impact on the Patient and Family 27
- Psychological and Social Aspects of Cancer Education 29
- Cancer Quackery 31
- Unproven Methods of Cancer Management 32
- The National Cancer Program 34
- Conclusion 35

PART II: SUPPLEMENTARY READINGS

- Is Cancer Contagious? 36
- Does Cancer Run in Families? 37
- Cat Leukemia Virus 38
- The Virus and Cancer 39
- Viruses and Human Breast Cancer 43

Page

Cystic Disease, Fibrocystic Disease of the Breast 48
Marijuana and Lung Cancer 49
Hormones and Cancer 50
Chemotherapy 53
Radiation Therapy 55
Cancer Immunotherapy 57
Blood Tests for Cancer 59
Cyclamates 60

PART III: FACT SHEETS

Cervical Cancer 61
Cancer of the Colon and Rectum 64
Cancer of the Pancreas 66
Thyroid Cancer 67
Wilm's Tumor 68
Testicular Cancer 68
Carcinogens in People 69

Appendix A: Breast Self-Examination 70
Appendix B: Periodicals 91
Appendix C: Books 95
Appendix D: Governmental Agencies 97
Appendix E: Sources of Educational Aids 98
Appendix F: Pamphlets 100
Appendix G: Films 103

HEALTH EDUCATION:
CANCER PREVENTION AND CONTROL

TEACHER'S TRAINING MANUAL

PART I: BASIC CANCER INFORMATION

INTRODUCTION

Cancer Education Is Necessary

In the early part of this century, the major threats to life and health were communicable diseases caused by specific pathogens. Today, the communicable diseases are largely under control while chronic and degenerative diseases and accidents have become the major health problems. These conditions, which include cancer, have no single cause but stem in large part from learned patterns of living adhered to over periods of many years.

This situation is exacerbated by the fact that more people are living longer in a society in which affluence, convenience and stress conspire to place them at increasing risk to chronic and degenerative disease. It is complicated further by the fact that the methods used to bring communicable diseases under control have little application to these diseases.

The changing pattern of disease problems has been paralleled by steadily increasing need and demand for high quality health care services that are available to everyone. There is great need to educate consumers about how the health care delivery system works and their role and responsibility in making it work effectively.

The remarkable advances in medicine and public health over the past 75 years, along with growing material affluence and growing freedom from preoccupation with survival activities, has encouraged the idea that health is not mere absence of disease but a positive quality of living.

When seen in the light of the new "organic" view of humanity as intimately and synergistically related to environments, it becomes clear that full health potential cannot be realized through a fragmented and unbalanced illness approach to the needs of the people.

Probably no other major chronic disease lends itself to amelioration through public health education as does cancer. But such education will be effective only if it is permanently integrated throughout the society in a manner that will shape healthful lifestyles in the American people. These curricula have been prepared with the view that health education must be a dynamic, comprehensive program, not a series of temporary efforts to correct isolated knowledge deficiencies or bad health habits.

The nature of cancer makes public education an essential tool in the effort to control the disease. Basic is the doctrine that "While cancer is fatal if untreated, or if treated late, the fact is that early cancer is among the most curable of major causes of death". Educational emphasis should always stress early diagnosis.

In explaining why early detection is vital, it was said recently: Cancer typically begins as a 'localized' disease. At the start, just one of the tiny cells of the body (or perhaps a few cells) undergoes an unfortunate change - it becomes a malignant cell, cancer. The cancer cell reproduces itself by dividing into two cells which in turn re-divide, and so on. All of the descendants of the original cancer cell are themselves cancer cells. Thus the cancer grows.

The great majority of cancers originate on the surface of some tissues such as the skin, the inner surface of the uterus, the lining of the mouth, stomach, intestines, bladder or bronchial tubes, or the lining of a duct in the breast, prostate gland or elsewhere. For a time, such cancers typically remain at the site of origin (in situ) and are visible only under a microscope, but later grow into a mass that can be seen with the naked eye.

After a time, some of the cancer cells penetrate beyond the surface and 'invade' the underlying tissues. This is 'invasive cancer'. After invading, the cancer continues to grow. But for a time, the cancer cells may remain more or less together as an intact mass, sometimes spreading irregularly. As long as all of the living cancer cells remain where the disease started, it is said to be 'localized'.

The more dangerous phases of cancer are the later ones. Some of the cancer cells eventually become detached and are carried through the lymph channels or blood vessels to other parts of the body. This process is known as 'metastasis'. But the body has a protective mechanism. The detached cancer cells may be trapped in a lymph node in the region of the original organ. This retards the spread for a time. This stage of the disease is known as 'regional development'.

If left untreated the cancer cells eventually spread to many parts of the body. This is 'advanced cancer'. Death is almost inevitable, although not necessarily quick.

The problem, therefore, is to detect cancer before it has spread so that it can be removed by surgery or destroyed by radiation and/or chemotherapy.

For unknown reasons, some cancers grow and spread slowly while others grow and spread rapidly. Some types spread with such rapidity that they are incurable at the present time. Fortunately, about half of all cancers are of the type that are presently curable.

Data from the end results survey of the National Cancer Institute (NCI) show the remarkable survival percentages of patients five years after treatment in early cases:

Early skin cancer	Approx. 100%
Early breast cancer	Over 80%
Early cervical cancer	Over 80%
Early colon cancer	Over 70%

Only through education can large numbers of potential patients be motivated to see their physicians or go to clinics in time for early diagnosis and treatment.

Fear Widespread

The beginning of cancer, the early multiplication of cells, are silent, without symptons, and the continuing development is often painless until the cancer is quite advanced. Studies of people's attitudes toward cancer in many countries agree that fear of this disease is general and deep; it is a fear not just of sickness or of death, but often terror of an unknown, unsuspected treachery of one's own body that may lead to prolonged suffering. For many centuries cancer was rarely cured - and so despair about cancer became the rule. In much of the world even the word "cancer" was only whispered. Today, we know the value of candid discussion of cancer in dissipating fear, at meetings, on television, in newspapers and magazines, in health classes, etc.

The Physician

Fear grew out of ancient tragedies. As the disease was studied and better understood, suggestions came for coping with it. The concept of the importance of getting to a physician "in time" was placed at the heart of public health education. Reasoning was that a physician can detect slight changes in the body that may indicate cancer before the patient is aware of anything unusual. Hence, the importance of such techniques as the Pap Test, mammography, careful examination by the trained physician with his fingers and his eyes cannot be over-emphasized.

Warning Signals

When changes do begin to appear that an individual can see in his own body, they are usually painless. While they may mean cancer, they generally reflect harmless abnormalities. However, only a physician can decide what these signs mean.

Below is one of the approaches widely used in public health education to publicize the nature of these changes:

Cancer's Warning Signals

Changes in bowel or bladder habits
A sore that does not heal
Unusual bleeding or discharge
Thickening or lump in breast or elsewhere
Indigestion or difficulty swallowing
Obvious change in wart or mole
Nagging cough or hoarseness

If you have a signal, see your doctor!

Curability Stressed

Fear that cancer is inevitably fatal often prevents people from seeking treatment. The emphasis in public education is on the curability of the disease, and the use of personal testimonials by persons who have been cured. Today's approach recognizes that people are much more willing to go to their physicians to find out they do not have cancer, than that they have it, even though it may be early. (This is why it is so important to explain to women that a breast lump is probably not cancer.) Encouraging evidence in attitude studies indicate that after years of public education there is a healthier view of cancer; that blind fear changes to a more realistic view.

Emphasis on Prevention and Detection

Surveys of public opinion about cancer have shown that fear was cited by 75 percent of women and 81 percent of men as the main reason for delay in seeking treatment for cancer. To stress prevention and hope, the "Seven Safeguards Against Cancer" have been developed. (See "Special Educational Goals for Grades 10-12").

OBJECTIVES OF CANCER EDUCATION

(1) To awaken an interest in the nature of cancer.

(2) To develop fear-free attitudes.

(3) To convey basic knowledge about cancer - its possible causes, symptoms, methods of detection and treatment, the possibility of cure, and the aim and scope of cancer research.

(4) To motivate individuals to seek further knowledge.

(5) To develop an appreciation of the role of the individual and society as a whole in spreading cancer knowledge to others.

(6) To show why certain actions, including annual health check-ups, breast self-examinations and the Pap Test, facilitate early detection and diagnosis, and, hence, may contribute to a cure.

(7) To suggest healthful behavior which may prevent cancer, especially the advisability of not smoking cigarettes and of avoiding excessive exposure to the sun.

(8) To show how cancer is a sociological, psychological and economic problem, as well as a health hazard.

(9) To stress the importance of consulting a reputable physician, and avoiding "quacks" and home remedies when cancer is suspected.

(10) To help solve the chief problem today of assisting people to become more aware of the basic cancer facts in such a way that they will use this knowledge to protect their own and their families health.

INTENT AND USE OF THE CANCER CURRICULUM GUIDES

Three guides have been prepared, one for each of grades 4-6, 7-9, and 10-12, respectively on the general topic of cancer. These guides were designed as an integral part of the "Disease Prevention and Control" unit.

Not too many years ago this would not have been possible, but through the past decades, information related to the prevention of this disease and to the early detection of its presence has been accumulated. Cancer is now a disease which is discussed in a more hopeful light, re-enforced by the constant research taking place all over the world.

Cancer is, however, the second leading cause of death in the United States. It is estimated that there will be over 665,000 new cases diagnosed this year (not including superficial skin cancer or carcinoma in situ of the uterine cervix) and that over 356,000 people will die. It is further estimated that one out of four Americans living today will have cancer at some time in their lives; a member in two out of three families will be affected.

The potential for saving lives through education according to the American Cancer Society's "Facts and Figures" publication is: "About 222,000 Americans will be saved from cancer this year. This means that about one-third of all people who get cancer will be saved. Another 110,000 cancer patients will probably die, who might have been saved by earlier and better treatment." This is the challenge to educators: to make available to all students the life-saving information on cancer prevention, early detection, and treatment.

The curriculum produced by Roswell Park Memorial Institute (RPMI) for the New York State Department of Education represents a step towards the overall objectives of cancer control. This is the first attempt to cover in school, on a comprehensive level, the facts concerning cancer. Of course, the topic of cigarette smoking and health has been given major emphasis in health education for a number of years. This is not meant to duplicate these efforts, but rather to supplement and reinforce. These materials are intended as a tool which the teacher can utilize to inform students about cancer in an interesting and positive manner.

The guidelines were developed with the objective of introducing basic concepts beginning in grades 4-6 and expanding upon them throughout high school. The guides should be used by the teacher as activity resources. The various tasks do not relate only to the health class, but can also be used in English, Art, Math, History, Economics, and, of course, Science classes. Certain activities involving simple work with a microscope have been suggested. This experience will help students grasp one of the most important biological facts, that all living things are made of cells, working together in a controlled and regulated manner for the organism's well-being. Only by understanding what is normal, can one understand what is abnormal and what to do about it.

A great deal of emphasis is placed on prevention: above all, the importance of not smoking. In the later grades it is strongly suggested that all girls receive instruction on breast self-examination and the Pap Test. We believe that it is not an unrealistic goal to reach 100% of all girls with this information in New York State before they graduate. Overall health attitudes and priorities are stressed throughout the guides. Activities have been written which stress the importance of personal action as well as the individual's responsibility to society. Any barriers which would hinder the early diagnosis of such a serious disease should be removed through education and open discussion. The sociological and psychological aspects of the disease are important and should be discussed and researched by the student. A special reference listing compiled through the Readers Guide to Periodical Literature is part of the guidelines. These are suggested references and by no means represent all the articles written about cancer in recent years.

The guides are adaptable to the needs, interest and developmental level of students. We realize that time devoted to such a unit varies from class to class, but the most important objective is that the major concepts be developed at each level. It is suggested that the teacher spend some time reviewing the booklet, "Cancer Rates and Risks", published by the National Cancer Institute and the annual publication produced by ACS, "1976 Cancer Facts and Figures", #5008. The NCI publication may be ordered by calling 1-301-496-3116. The ACS booklet may be ordered through any county unit of the American Cancer Society.

Teachers should review the wide variety of teaching aids on cancer which are listed in the guides. Audio-visuals, overhead transparencies and demonstration activities are compiled for your use. Community agencies such as the ACS can assist in special program planning, such as visiting lecturers, films, and free educational supplies. This training manual offers a background of factual cancer information for the teacher. The three guides complement this information with supplementary facts for the student.

THE NATURE OF CANCER

Cancer is a group of diseases arising in the body's cells, characterized by unrestrained cell growth. It is a new growth of cells, hence the term neoplasm, or tumor. A tumor may be defined as a mass of new tissue which persists and grows independently of its surrounding structures, and which has no physiologic use. Cancer is found in all races of people and in all animal species.

Normal cells have specific structure and rate of growth and division which cause them to properly fulfill their function. Such characteristics are genetically determined and are inherited by each new generation of cell. Abnormal cells do not follow this orderly path, but proceed as "social outcasts" spreading at will with apparently little central control.

The characteristics of most forms of cancer are as follows:

1) A higher rate of cell growth than the normal tissues from which the cells arise;

2) failure to maintain the boundaries of normal tissues and organs;

3) a microscopic appearance resembling immature, dedifferentiated rather than mature tissue (dedifferentiated cells are those without specific structure and function);

4) a tendency to spread to parts of the body distant from the original site of the cancer (metastasis).

Not all of these features accompany every form of malignancy, but they are characteristic of most forms. Not all tumors, of course, are malignant. Such tumors are called benign.

The characteristics of a particular cancer depend largely on the characteristics of the healthy cells from which it arises. Most body structures are composed of tissues made up of many different types of cells - muscle, connective tissue, glands, blood and lymphatic vessels, etc. Any one of these different cell forms may give rise to cancer. The three types of cancer are:

1) Sarcomas - arise in connective tissues including muscles and bones.

2) Leukemias and Lymphomas - are cancers of the blood-forming organs.

3) Carcinomas - arise from epithelial cells which line the body's internal and external surfaces.

    a) Adenocarcinomas - arise from glandular structures. Most cancers in the digestive tract are of this type.

    b) Basal cell carcinomas - arise in the skin from the basal layer of epidermis.

c) Squamous cell carcinomas - arise at any site covered by stratified squamous epithelium, such as skin, mouth, esophagus, and rectum.

Varying types of cancer grow at different rates and have varying causes. The cell type is an important consideration in determining proper therapy and prognosis of the disease.

While the complete process by which cancer is induced has not been determined, many agents, both intrinsic and extrinsic to the body, have been found which are believed to be carcinogenic (cancer causing).

Cells become malignant as a result of changes in their genetic chemistry. Ordinarily, the rate of cell growth and division, the structure and function of each cell is controlled by the cells DNA. The mechanism by which DNA is altered is not clear, although chemicals, radiation and viruses have been implicated.

Chemical carcinogenesis is the term applied to those chemicals which are known or suspected to be carcinogenic, possibly with the help of viruses. The intensity and duration of exposure necessary to develop abnormal cell growth varies.

Cigarette smoking is the greatest preventable cause of cancer known today. PAH (polycyclic aromatic hydrocarbons) and other chemicals found in cigarette tars have been shown to be highly carcinogenic. A strong relationship between smoking and cancer of the lung, larynx, oral cavity and esophagus has been shown. Smoking has also been shown to be related to cancer of the urinary bladder. Any program in cancer control must have as a prime goal the reduction of cigarette use. Teachers have a responsibility to themselves and to their pupils, who look to them as an example, not to smoke.

Environmental pollution may also be a source of carcinogenic chemicals. Certain occupational exposures have been shown to cause cancer.

(1) Chimney sweeps - The incidence of skin cancer in sweeps was first related to their exposure to soot in the 18th century. Soot is now known to contain chemicals also found in cigarette smoke.

2) Asbestos - Asbestos workers have a far higher incidence of gastro-intestinal and lung cancer than the general population. The families of workers, exposed to asbestos they bring home on their clothes, also have higher cancer rates.

3) Vinyl Chloride - Workers exposed to monovinyl chloride develop liver cancer. There is no evidence that polyvinyl chloride, a common plastic, causes cancer, however.

These and other pollutants are found in the general environment, in lower concentrations. The long-term effect has not been determined but urban dwellers have higher cancer risk than rural dwellers. Cigarette smokers are more susceptible to the effects of pollution than are non-smokers.

Diet - Certain foods or chemicals found in foods, both naturally or as a result of processing, are suspected of causing cancer. Vitamin deficiency may be a factor in some cancers. For example;

1) Aflatoxin - A liver carcinogen produced by a mold, has been identified as a contaminant of nuts and other foodstuffs in areas of high liver cancer incidence.

2) The heavy use of smoked and pickled foods is suspected to relate to high levels of stomach cancer in Iceland and Japan.

3) There is speculation linking the highly refined Western diet, rich in starches and low in bulk, with the elevated risks of bowel cancer in Europe and North America.

4) Sodium nitrite, used in minute amounts to prevent spoilage in processed foods, causes cancer in laboratory animals. No direct relation to cancer in humans has been found.

Radiation - High doses of radiation or lower doses over a longer term can cause many different types of cancer. The following are common examples:

1) The single greatest source of ultraviolet radiation, the sun is the principal cause of skin cancer. Light skinned persons and persons working outdoors, such as farmers or sailors, are the most susceptible. All people should protect themselves from undue exposure to the sun.

2) Although at present only a small fraction of tumors are induced by artificial radiation, the number will probably grow as the use of radioactive materials increases.

   Medical uses of radiation include:

   - Radiotherapy - persons exposed to therapeutic doses of radiation for conditions such as enlarged thymus and skin problems have increased risk of cancer. Most such treatments have been discontinued.

   - Early radiologists and others who worked with radioactive materials, unaware of the need for precautions, developed leukemias and sarcomas. Today, strict precautions are followed.

   - Diagnostic x-rays - of much lower power than therapeutic doses - present very little danger, although they should be used only when necessary. X-rays during pregnancy may increase risk of leukemia in the offspring.

3) Atomic fallout - The survivors of atomic bombing of Hiroshima and Nagasaki have suffered increased leukemia and other cancers. Exposure to fallout from atomic tests or industrial accidents presents a similar risk. Threshold limits of exposure below which there is no effect have not been established with certainty.

Viruses - The origin of a wide range of animal tumors has been linked to action by viruses. The outcome of a particular viral infection depends on species, strain, age, hormonal factors, route of infection, and specific immunological factors. There is evidence, but not yet proof, that viruses cause human cancers.

Viruses are minute infectious agents, characterized by a lack of independent metabolism and the ability to replicate only within living host cells. Chemically they resemble DNA and RNA. They may be actively incorporated into the host DNA, thus changing the genetic message. It has been suggested that tumor induction may require the triggering of latent viruses in the cell by an external chemical or physical agent.

Among the human cancers for which a viral cause has been suggested are: leukemia, Burkitt's lymphoma, cancer of the uterine cervix, breast cancer, and sarcomas. Such speculation is based largely on animal tests.

The major sites of cancer are the skin, colon and rectum, lung, breast, and uterus. Even taking into account the increase in population and life-span, the incidence of cancer has risen in the past 35 years.

The risk of developing cancer will vary depending upon personal (endogenous) and environmental (exogenous) factors:

1) The likelihood of developing most cancers increases with age. Men are somewhat more likely to develop cancer than women.

2) A 20 year old person has a one in four chance of developing cancer at some time in his life.

3) Rates for whites is higher than rates for blacks, although the rates for blacks have been rising faster. For specific sites one race may have a higher rate than the other.

4) Rates for specific sites have changed during the course of the century while rates for other sites have remained about constant. The most dramatic increase has been in the rate of lung cancer, due largely to an increased use of cigarettes. The most dramatic decrease has been in the incidence of stomach cancer, due possibly to changes in diet and methods of food preservation.

CANCER SITES

Cancer may strike anywhere in the body, although some sites are more common than others. The nature and treatment of the disease varies from site to site. Fortunately, early cancer in the most common sites is preventable or easily detected, when it is still highly curable.

SKIN CANCER is the most common of all cancer. Superficial skin cancer strikes more than 300,000 Americans a year. It is easily cured, however, and only about 5,000 Americans die each year of all skin cancers. Skin cancer is more common in Southern states, among persons with outdoor occupations and among the fair-skinned.

Since most skin cancer is caused by over-exposure to the ultraviolet rays of the sun, the best prevention is to avoid such over-exposure. Some safety tips are:

1) Take your sun in small doses, avoid burns.
2) Wear a broad-brimmed hat and long sleeves if you are in the sun frequently.
3) Use an effective sunscreen containing PABA or a PABA derivative, (para-aminobenzoic acid). Ordinary suntan lotion offers no protection.
4) For highly exposed areas such as cheekbones, nose, lips and ears, use an opaque sunscreen containing zinc oxide or titanium oxide.

The possible signs of skin cancer are simply a sore that does not heal, and changes in a wart or mole. Skin cancer is diagnosed by a simple biopsy (the removal and microscopic examination of tissue).

The usual methods of treating cancer of the skin are surgical removal of lesions or treatment with x-rays. Sometimes a combination of both methods is used.

Researchers at Roswell Park Memorial Institute have developed a new form of treatment called immunotherapy which stimulates the body's immunities to destroy the cancer cells of the skin.

CANCER OF THE LARGE BOWEL is the most prevalent internal cancer in the U.S. There will be an estimated 99,000 new cases in 1975 and 49,000 deaths. It strikes men and women in about equal numbers. Its likelihood increases with age. Large bowel cancer is far more common in North America and Europe than other areas of the world.

Speculation has linked the incidence of colon-rectal cancer to the high carbohydrate, low-bulk diet of the most advanced countries. This connection has not been proven. While there is an increased risk in relatives of patients with colon-rectal cancer, environmental factors are probably more important than hereditary factors. Familial polyposes, ulcerative colitis, villous adenoma are predisposing conditions to colon-rectal cancer. There is no casual relation between hemorrhoids and cancer.

Detected early, cancer of the colon and rectum is a highly curable disease. Possible symptoms are any long-lasting change in bowel habits, bleeding or unusual discharge. The best method of detection is proctoscopy. A proctoscope is a lighted tube passed into the rectum and lower colon by which the physician can inspect the wall visually. A "procto" should be part of the regular health checkup for everyone over 40. Patients should insist on complete physicals to include the procto.

Large bowel cancer is almost always treated by surgical removal of the tumor and, possibly, part of the colon. Sometimes this is supplemented by chemotherapy. Treatment sometimes results in a colostomy, an artificial opening in the abdomenal wall through which waste is excreted.

LUNG CANCER is the leading killer among cancers, killing an estimated 81,000 people this year. There will be 91,000 new cases. Lung cancer kills about six times as many men as women, reflecting the fact that in the past, men were more likely to smoke and smoked more than women. In recent years, the rate of increase of lung cancer among women has been greater than men's, reflecting their increased use of cigarettes.

About 90% of lung cancers occur among smokers. Elimination of the use of tobacco, especially cigarettes, would make lung cancer a relatively rare disease. The risk of lung cancer increases with the number of cigarettes smoked per day, the duration of smoking, the depth to which the smoke is inhaled, and early initiation. Persons who quit smoking reduce their risk of developing lung cancer considerably. Susceptibility may be hereditary.

Smoking is also causally related to cancer of the larynx, oral cavity, urinary bladder, and esophagus. Occupational exposure to uranium ore, asbestos, nickel and chromate increases the risk of lung cancer, but more so for smokers than non-smokers.

A persistent cough or lingering respiratory illness may be a symptom of lung cancer. A chest x-ray should be part of the yearly physical checkup.

Lung cancer is usually treated by radiation or surgical removal of the lung or part of the lung. These are sometimes supplemented by chemotherapy. Lung cancer is among the most difficult cancers of all to treat successfully. Less than 10% of all patients survive five years, although the rate is considerably higher for those with localized lung cancer.

The effect of cigarette smoke on the non-smoker can be significant. This fact is being recognized by people and steps are being taken to protect the non-smoker. Smoke from the burning ends of cigarettes has been shown in experimental studies to increase the level of carbon monoxide, and other harmful substances in the air. This is especially true in poorly ventilated rooms. People with chronic problems such as asthma and heart disease could be placed in a less than favorable position with this harmful increase. Many people are allergic to tobacco smoke and are visibly affected by higher concentrations of noxious gases. These facts have led to new legislation in New York State and in other areas of the country, limiting smoking to designated areas.

BREAST CANCER is the most common internal site of cancer among women, and will strike about 89,000 women this year. Almost 33,000 will die. It occurs, very rarely, in men. One in fifteen women develop breast cancer at some time in their life. Breast cancer is more common among women of European extraction than among Orientals. A woman whose sisters, mother, or maternal relatives have had breast cancer is at greater risk (approximately one in seven) than a woman without such a history.

The cause of breast cancer remains unknown. However, cystic mastitis is a predisposing factor to breast cancer. In addition, a viral cause for mammary tumors has been demonstrated in mice and suspected in humans. A woman's hormonal status is also clearly related to risk. Women bearing children at an early age are less likely to develop breast cancer than nulliparous women. There is no indication that oral contraceptives cause breast cancer.

The best and most practical method of breast cancer detection is monthly breast self-examination (BSE) by all women. BSE should be performed every month after the menstrual period, and at regular monthly intervals after menopause. Most breast lumps are not cancerous, but only a doctor can tell for sure. A woman should report any breast changes to the doctor immediately.

The procedure for breast self-examination is best demonstrated on a "Betsi" Teaching Model. The steps include:

1) Inspect the breasts visually in a mirror, watching for dimpling, distortion in shape, or changes in the nipples. Any discharge from the nipple is suspicious.

2) Lie down. Put one hand behind the head. With the other hand gently feel the opposite breast for lumps or thickening. Work in a clockwise direction, starting on the outside of the breast and spiraling in towards the nipple. Be sure to feel all parts of the breast. Repeat the procedure for the other breast.

3) Repeat the procedure sitting up, with the hand still behind the head. The most important aspect of any procedure is that all the breast area is covered thoroughly.

Every woman should have an annual physical examination, including a Pap Test and breast exam by the physician. This complements and does not replace the monthly BSE. A teacher's training guide for BSE is in the Appendix.

Other methods of detecting breast cancer early are as follows: Mammography and xeroradiography are x-ray methods which may enable a physician to detect a tumor before it can be felt on palpation. Because of the expense and small but real danger inherent in such tests, these methods are not advisable for all women. Unnecessary x-radiation should always be avoided. Such techniques are best used at the discretion of the doctor and, possibly, for mass screening of women in high risk groups (women with cancer in one breast, women over 40 with breast cancer in their family).

Thermography uses infra-red techniques to scan the breast surface for "hot spots" (tumors produce more heat than normal tissue). The reliability of this method has not been established.

Surgical removal of the breast is the treatment of choice, often supplemented by chemotherapy and, when necessary, radiotherapy. Mastectomy is surgical removal of the breast and, usually, adjacent lymph nodes. It may be radical mastectomy which involves removal of the affected breast, lymph nodes, and underlying muscles of the chest wall, or modified and simple mastectomy which preserves the muscles in the chest and provides more mobility in arm and less disfigurement. Lumpectomy is removal of the tumor and immediately adjacent tissue only, attempting to preserve the breast. Most physicians regard this as incomplete therapy, as cancer frequently arises at more than one site in the breast at a time.

UTERINE CANCER: There will be 46,000 cases of UTERINE CANCER this year, most of them in the cervix. 11,000 women will die of it. This cancer occurs with greater frequency among blacks and low-income whites, because they are less likely to have regular Pap Tests which is a simple method of detecting uterine cancer in its earliest stages. Precancerous cellular conditions can be detected by the Pap Test, and therapy instituted which prevents the development of cancer.

Factors reported in the literature to be associated with an increased risk of cervical cancer include early marriage, promiscuity, multiple and broken marriages, young age at first intercourse. There is evidence relating cervical cancer to previous infection by Herpes Simplex Type II Virus. Whether this virus is transmitted venereally and thus causes cancer has not been determined.

The chief warning signals of uterine cancer are unusual bleeding or discharge from the vagina, bleeding between periods, and bleeding after menopause. The Pap Test is the best method for detecting uterine cancer in its early stages while still highly curable. Developed by Dr. George Papanicolaou, this test has become generally available to women over the past 30 years. The Pap Test is a simple, painless procedure in which cells are scraped off the cervix and collected from vaginal fluid and microscopically examined. Any woman, regardless of age, who has begun having sexual intercourse, should have a Pap Test once a year. Such tests may be available free from county health departments.

Carcinoma in-situ (non-invasive cancer) may be cured by simple surgical procedures which do not cause loss of reproductive function. Under a doctor's observation, women wishing to have children may do so. Cervical cancer is most often treated by radiotherapy, usually in the form of radioactive implants. Cancer of the body of the uterus is more often treated by surgery or a combination of surgery and radiation.

LEUKEMIA is the most common cancer among children. However, it actually strikes many more adults. Leukemia is a disease of the blood-forming organs, causing the over-production of immature white blood cells. Its frequency is relatively high among children under 10, uniformly low in persons 10-35, and gradually rises after 35.

Exposure to radiation from diagnostic and therapeutic x-rays, atomic bombs, and pre-natal x-rays leads to increase risk of leukemia. Therefore, physicians prescribe x-rays only when necessary.

There are no specific early signs of leukemia. Possible symptoms are fatigue, pallor, nosebleeds, and other hemorrages. Early cases are detected by routine blood examinations which should be part of a regular annual examination.

Long term remissions of chronic leukemias have been achieved using combination chemotherapy and radiation. Treatment of acute leukemias, while less successful, also gives reason for hope with new combination drug treatments. Leukemia patients usually do not die of the disease, but of its effects, mainly hemorrhage and infection. These can be controlled with supportive therapy: antibiotics, special germfree environments, and platelet transfusions to prevent hemorrhage.

THE PREVENTION OF CANCER

Preventive cancer information is based upon research findings regarding the causes of this abnormal growth. There have been few carcinogens identified in people, but those which have are very important. The complex tar found in burning cigarettes, and the ultraviolet radiation from the sun are known carcinogens in people. A few others, such as found in chewing tobacco, aniline dyes, coal, tar, asbestos fibers, and several other forms of radiation are known to cause cancers in people.

Two of the most common forms of cancer, lung and skin, are to a great degree preventable. Other common forms of cancer such as colon and rectum, breast, mouth, and cervical can be detected very early by methods developed quite recently. All are treatable and most curable when detected early.

The Seven Safeguards of preventive cancer education are:

1) To avoid lung cancer, a disease which affects over 90,000 Americans and kills over 80,000 each year, the best tip yet is not to start smoking cigarettes, or to join the 30 million Americans who have quit. Lung cancer is difficult to detect and treat, but easy to prevent.

2) Skin cancer can be prevented by avoiding over-exposure to the sun. The single most common cause of skin cancer is repeated over-exposure to the sun's ultraviolet rays. Chemical sun screens, hats, and umbrellas are ways in which the more susceptible, fair-skinned person can protect her/himself. It is estimated that at least 95% of skin cancer could be cured if sores which did not heal were reported to a doctor early.

3) Breast cancer is the leading cause of cancer deaths in women today. The best methods for early detection are monthly breast self-examination, and an annual doctor's check-up. Doctors may request mammography, thermography or xeroradiography tests should there be any reasons for suspicions of abnormal growth. Eight of ten lumps are not cancerous, but all symptoms should be brought to the attention of a physician. Survival is 85-90% when found early.

4) Mouth cancer is not as common as the other cancers mentioned here. Approximately 23,000 cases are expected each year. Mouth cancers are easily detected during a thorough oral examination by a dentist or doctor. Many mouth cancers are related to smoking and drinking alcoholic beverages.

5) Cervical cancer is no longer a leading cause of death among American women. The incidence of the disease is not decreasing, but the death rate over the last twenty years has decreased a phenomenal 51%. This is related to the public and professional acceptance of the Pap Test as a regular part of the annual health check-up. Facts about the Pap Test should be presented by health educators to the student sometime before high school graduation. Treatment of this form of cancer is almost 100% successful when the Pap Test is used as an annual diagnostic test.

6) Colon and rectal cancer is (with the exception of superficial skin cancer) the most common form of cancer in the U.S. The key to early diagnosis of this disease is proctoscopy - the passing of a small lighted tube into the lower part of the rectum and colon. Approximately 75% of colon and rectal cancers are found within reach of the proctoscope. It is estimated that three out of four patients might be saved by total utilization of this detection method for people over forty years old.

7) Public education and the annual physical examination - Through intensive education efforts in the previously mentioned six areas, 60% of all cancers could be found earlier. These same six sites add up to over 50% of annual cancer deaths, consequently, even with the relatively few preventive measures we now know to be effective, one half of today's cancer deaths could ideally be cancer cures.

The annual physical is the seventh and most important safeguard. Early detection should be a goal for two people, the doctor and the patient. Good health habits begin early. Therefore, the importance of the annual physical should be taught early.

CANCER TREATMENT

There are presently four acceptable forms of treatment for cancer as follows: Surgery, radiation therapy, chemotherapy, (drugs and hormones), and immunotherapy.

Surgery is the oldest method of cancer treatment, but it was not until the 19th century that the method was standardized. Presently, new anesthesia and antiseptic methods have greatly reduced the post-operative risks. Since cancers are diseases which have the capability of spread, the surgeon must remove some healthy tissue surrounding the tumor, and in many cases, the surrounding lymphatic channels.

In the late 19th century, radiation therapy became the second form of cancer therapy through the discovery of radioactivity by Becquerel and the discovery of x-rays by Roentgen. These new discoveries quickly were utilized in the treatment of skin cancer and before the turn of the century, some forms of cancer were being successfully treated. Through the combined efforts of engineers, psychiatrists, and medical authorities, radiation therapy has become a very potent tool in the treatment of malignant diseases.

Chemotherapy is a relatively new concept in the treatment of malignant disease. In 1945 nitrogen mustard was found to be active against lymphomas. Since then, over thirty drugs have been found to be active against various cancers. Frequently, chemotherapeutic drugs are used in combination with other forms of treatment or with each other.

Almost all of the drugs used in cancer therapy are non-specific, which means that they can kill normal cells as well as the abnormal, malignant cells. Logically, the use of these compounds calls for careful administration for the best results. Patient support methods have been developed to assist the individual through the period of active treatment toxicity until the normal body cells can repair themselves. Germfree environments and specific blood cell transfusion, such as platelets and white cells, have made it possible to give larger doses of drugs without jeopardizing the patient's overall welfare.

Hormone levels may be adjusted up or down to arrest the progress of cancer and even induce a regression for a period of time. These effects are not permanent, however, with growth resuming at a later time.

Immunotherapy research has shown that tumor-specified antigens exist in animals. It has also been found that animal tumors may be prevented or cured by immunological procedures. It seems very possible that a similar reaction may occur in people. Clinical treatment using immunotherapy is still experimental but may prove to be of practical value in the near future.

Success in Cancer Treatment

- The ability to cure cancers which are not localized (have spread) is a new factor in the control of the disease.
- Cure means that an individual has the same life expectancy as the rest of the population even though cancer was present.
- Increasing numbers of "Cancer Centers", which should become centers for medical care, education, and the coordination of the cancer campaign, is necessary.
- Increasing numbers of cured cancer patients will be the rule of the future.
- Doctors now realize that the total cure of the cancer patient involves much more than just removing all the cancer. The total impact of cancer on patients and families is being brought into focus and dealt with more now than ever before.

Management of Pain

Many effective analgesics such as aspirin, acetaminophen (Tylenol), and propoxyphene (Darvon) are available to physicians. Narcotic drugs such as morphine and meperidine (Demerol) are useful to manage more severe pain. The risk of drug addiction in the case of narcotic drugs is seldom a factor in a doctor's decision to prescribe them for analgesic purposes.

In most cases, these drugs can be used in the quantity needed to control pain. As with the use of any drug, however, undesirable side effects must be considered. Dosage levels must be tailored specifically to an individual patient's condition and need. Not only must the patient be prepared to sacrifice mental clarity and alertness, but when large doses are necessary, the patient must be carefully observed to avoid the occurrence of respiratory depression, which may be life threatening.

Therefore, management of pain by the use of analgesic drugs must be carefully individualized. Response to pain is variable and depends upon many factors, such as an individual's pain threshold, the general physical and emotional condition of the patient, and the type and location of the cancer. Fortunately, all cancer patients do not suffer extreme pain, and most physicians will discuss the relief of pain with the patient and suggest several therapies.

GENERAL CANCER RESEARCH

Cancer research tools include both living things and laboratory equipment. Once research into cancer began, it did not take people too long to understand and differentiate the varieties of cancers, and to recognize that they occurred in all living things.

The mouse, not the guinea pig, is the most important lab animal. Other important lab animals are, rats, rabbits, chickens, lower primates, and hamsters.

Below is a list of some common techniques used in the laboratory to assist in cancer research:

1) Electron microscopy - high power magnification
2) Ultra-centrifugation - separation of substances
3) Column, paper, and gas chromatography - separation techniques for identification
4) Isotopes used in labeling - used to track and identify specific cells and pathways
5) Cancer cell culture - the growing of cancer cells _in vitro_ for research
6) Germfree environments - animals without natural immunity are good candidates for tumor transplants and drug therapy

A vast area of research is involved with the study of the cancer cell itself. The cancer cell develops from a normal cell and may resemble the normal in many structural details. The growth of the cancer cell is not controlled by mechanisms of the body. Uncontrolled growth is a typical characteristic of cancer. Many of the structures found in normal cell cytoplasm are missing in cancer cells which tend to cause metabolic or functional problems in the abnormal cell. Scientists hope to find what "turns on" and "turns off" the cancer cell.

Another key area of research is the possible causes of cancer. The following is a listing of possible causes or factors associated with cancer: Certain chemicals produce cancer. Over 500 carcinogenic compounds have been identified which cause cancer in laboratory animals. Others related to cancer in people are coal tar (similar compounds are found in cigarette smoke), chemical azo-dyes, vinyl chloride, and nitrosoamines. Physical factors related to the cause of cancer are chiefly the ultraviolet rays of the sun and exposure to forms of radiation (atomic bomb radiation). Hormonal imbalance is being researched as associated with the cause of cancer. For instance, three factors: hormonal, genetic, and viral, all play a part in the evolution of breast cancers in laboratory mice.

The search for viruses associated with human tumors (most commonly leukemia) may someday lead to an anti-leukemia vaccine. Viruses are not just disease causing organisms; some cause disease in plants, destroy bacteria, assist immunology functions, are latent viruses (non-active, but can become active), and some are associated with tumors. Because of research into viruses the knowledge of virus actions has increased greatly.

The objectives of research into detection, treatment and prevention of cancer are as follows:

1) To improve methods of diagnosis to such a degree that tumors can be detected much earlier.

2) To improve treatment modalities so that even late stage cancers can be arrested.

3) To find more effective forms of prevention so there will be no need for diagnosis or treatment.

It is speculated that over 75% of all cancers could be avoided. Through research in carcinogenic chemicals, elimination of compounds in diets, avoidance of certain environmental factors, and the elimination of hazardous occupational carcinogens, the incidence of cancer may be reduced.

REHABILITATION OF THE CANCER PATIENT

Rehabilitation is the fourth phase of medicine, the first being prevention, the second diagnosis, and the third treatment.

Rehabilitation involves meeting the physical, social, emotional, vocational, and educational needs of the patient. With modern treatment techniques there is no reason why the cancer patient cannot be offered the same rehabilitation programs people with other chronic illnesses receive. Rehabitation is an increasingly important part of cancer recovery because of the larger number of cancer patients being saved.

The rehabilitation goals fall into three general categories as follows:

- Restorative - Recovery from initial problem with little or no handicaps.
- Supportive - Return to a self-supporting status even though a permanent disability is present.
- Palliative - The goal for patients who have far advanced diseases who can regain independence and perform daily tasks with a reasonable amount of comfort.

The rehabilitation team consists of a variety of people who are needed to take care of the physical restoration and the life adjustment aspects of rehabilitation. Below is a brief description of the possible rehabilitation process:

- Medical Service - Evaluation of the patient.
- Physical Therapy Service - Restoration of full strength, coordination and stamina.
- Occupational Therapy Service - A therapy with many goals such as restoration of physical function of the upper extremity, a prevocational evaluation, pre-prosthetic conditioning, assistance for the homemaker, re-adaptation instructions in daily living, personal hygiene, and activities while in the hospital's care to promote mental functioning and vocational interests.
- Enterostomal Therapy Service - For patients who are expected to have a colostomy, ileostomy or artificial bladder.
- Maxillofacial Prosthetics - For patients who need plastic reconstructive work following head and neck surgery.
- Speech Therapy Service - For those patients who have need of learning to speak again, usually following oral or neck surgery.

- Social Services - Assists patients with any personal or family problems.

- Vocational Counseling Service - Provides vocational counseling and guidance to patients.

- Religious Service - Discussion session with the family clergyman or the hospital chaplin can be very important for the patient.

- Volunteer Service - Very helpful in a variety of services including psych-social supportive, transportation, counseling, and recreational.

- Mental Health Service - To deal with the psychological impact of cancer through psychiatric and psychologic services.

- Patient Health Educator - Deals with educating the cancer patient to help him/her to understand the nature of his/her condition and the necessity to follow medical instructions during and following treatment.

THE ECONOMICS OF CANCER

The Cost of Cancer

- The total direct costs for treatment of cancer is estimated to be from $5,000 to $20,000 for one patient (1975) per year.

- Funds spent on changing people's attitudes about cancer are being considered. This may do more than anything else in reducing costs of cancer through early detection and treatment.

Employing the Recovered Cancer Patient

- Through a study done by Metropolitan Life Insurance Company, it was found that selective hiring of persons who have been treated for cancer in positions for which they are physically qualified is a sound industrial practice.

- The return of work of an employee who has recovered from cancer is not the problem it once was.

- 77% of all types of cancer patients return to duty. 68% of GI cancer cases return to work. 85% of breast cancer patients return to duty. 88% of female genital cancers return to work. Only 18% of the lung cancer patients return to duty.

The Implications of Cancer for the Labor Union

- There are at least three special implications of cancer for the industrial worker:
  1) Worker's health coverage
  2) Worker's right to a job or reemployment opportunities.
  3) Occupational hazard of cancer for the worker while on the job.

- Trade unions are in collective bargaining at the present time to attain adequate health coverage for their workers.

- No industry or business up to this time makes special provisions for the return of a worker who is severely handicapped or one who has been successfully treated for cancer.

- No one along the local, state or federal lines has proceeded with sufficient vigor to eliminate a group of preventable malignancies which have been scientifically linked to occupations.

Insurance for the Cancer Patient

- Insurance is available for cancer patients. However, because there is the possibility of recurrence of cancer, the type and extent of the coverage of the insurance must be under certain restrictions of the insurance company.

CANCER'S IMPACT ON THE PATIENT AND FAMILY

The Patient's Perspective on Cancer

- There is usually a period of disbelief and depression that one goes through.

- Support from people and becoming involved in life are very important to a cancer patient.

- A majority of doctors feel that it is best to be honest with a cancer patient in telling him the seriousness of his cancer. Concealing information is not a healthy situation.

- The family as well as the patient should be told the same facts supportively so that they can cope with them together.

Psychological Aspects of Cancer Recovery

- It is of great importance to project what knowledge there is about cancer cure to the general public.

- Fear of recurrence is almost totally present.

- Cancer patients must be prepared to cope with the possibility of death, the effects of drugs, radiation therapy and surgery, and the acceptance of chronic illness.

- Many patients set goals of 3, 5, or 10 years and to them reaching this date is one more positive step in their cure.

Social Aspects of Continuing Cancer Care

- Cancer patients react in a variety of ways when they are told about the problem: depression, denial of illness; denial of anxiety or concern; guilt for having delayed medical attention; fear of becoming dependent on others; fear of pain; fear of mutilation; difficulty in employment; feeling of aloneness; feeling of inadequacy as a spouse, mother or father; fear of rejection; and threats of suicide.

- Social workers usually use a family-oriented approach to work with their patients.

In an extensive study taken by Cancer Care, Inc., in New York City, the most common family hardships during cancer therapy and rehabilitation were discussed. The table below shows the results very clearly:

Family Hardships

Hardship Reported	Percent Families Affected
Emotional or adjustment problems on the part of family members	76
Cutbacks in food, clothing, health care of other family members, and/or recreation	71
Use of money allocated to other purposes; such as, education, travel	62
Loss of income by patient or other family member	61
Changes in life plans; such as, starting a new business, and/or building a home	38
Loss of opportunity for promotion	21
Relocation of employment and/or living quarters	15
Change of job by patient or other family member	8
Family breakup; such as, child placement	5

PSYCHOLOGICAL AND SOCIAL ASPECTS OF CANCER EDUCATION

Psychological Aspects

Fear is one of the most important roadblocks to be overcome for greater control of cancer. Fear is a major reason that more people do not receive early treatment. They may be aware of cancer symptoms, but precisely because they fear it is cancer, they do not consult a physician. The sources of this fear are:

a) Fear of death - Many people continue to regard cancer as an inevitably fatal disease.
b) Fear of disfigurement and disability - The fear many women have of breast cancer is perhaps the most obvious, but not the only example.
c) Shame and modesty - Though discussion has become much more open recently, many people continue to regard cancer as a disease to be ashamed of, a sign of immorality.

Modesty regarding certain parts of the body as the genitals, breasts, or bowels, makes many people unwilling to discuss possible symptoms even with a physician.

Fatalism is a notion regarding cancer which inhibits many people from taking sensible preventive and precautionary steps. Many people believe cancer is an inevitable consequence of modern life, that "everything causes cancer so it doesn't matter what you do or don't do". This argument is often heard from cigarette smokers. People should be aware that cancer is not inevitable, that there are many things an individual can do to protect his own health and well-being. The body is the one environment a person cannot escape, but it is also the one over which he has the most control.

Educators should help students to become aware that:

a) Many cancers are curable and more easily treated when the disease is detected and treated early.
b) Many cured cancer patients with their disease in regression can live completely normal lives and many others adjust to disabilities with minimal disruption.
c) The patient is part of a team with health professionals, and has a responsibility to himself and others to contribute to his own health care.

Social Aspects

Economic impact of death and disability due to cancer and the costs of treatment and care is considerable in the U.S. Serious economic problems such as lost jobs and profits, and even a reduction of the general standard of living may arise from efforts to control cancers that are or may be caused by:

a) Occupational exposure to carcinogens.
b) Industrial pollution of the general environment.
c) Carcinogens found in consumer items.
d) Pollution and other dangers arising from the production of energy.
e) Automobile pollution.

The risk inherent in the manufacture or use of a product must be weighed against the benefits to the individual and society of that product. The need for government regulation inevitably makes the issue a matter of political, as well as scientific, debate. Decisions should be made not on the basis of emotionalism or self-interest, but impartial scientific findings.

CANCER QUACKERY

There is no "secret cure" for cancer. Anyone claiming to have a secret cure should be regarded as a quack. Fear of cancer, ignorance, and the desperate desire to extend life and avoid extensive, but necessary, treatment causes people to rely on quacks and unproven cancer treatments. Time is wasted and effective treatment postponed. Many people actually lose their lives.

Quacks have many characteristics in common. They often claim to offer treatment available only from themselves. The "treatment" may bear the quack's own name or be offered in the name of a private research organization. Quacks often claim they are being persecuted by the medical trust, and use testimonials or letters from patients in support of their treatment. Quacks often refuse or discourage consultations with specialists in the medical profession. Frequently, the cancer is diagnosed by the quack and the "cured" patient has only the quack's word for it that he or she had cancer in the first place. A quack may be an M.D. or may simply affix the title "doctor" to his or her name.

Among the most famous and most enduring of unproven cancer remedies are "Laetrile" and "Krebiozen". Laetrile (or "aprikein" or "vitamin B-17") made from apricot kernels is available from "clinics" in Mexico and may not be prescribed for cancer treatment in the U.S. Tests by reputable scientists and physicians have shown laetrile to be without benefit in treating or preventing cancer and several U.S. courts have outlawed its role on that basis.

Krebiozen, the subject of public and political debate in the 1960's was found to be manufactured from horse plasma or horse meat, and in some cases, to consist of only mineral oil. A review by a special committee of the National Cancer Institute found "that Krebiozen does not possess any anti-cancer activity in man". Despite this finding, Krebiozen continued to have outspoken and influential champions.

Further information on quack treatments may be found in "Unproven Methods of Cancer Management", (Code #3014) available from ACS.

Reputable physicians do not offer exclusive treatments. Treatments of proven effectiveness are widely available in many hospitals. Reputable doctors do not "patent" treatments and are members of recognized medical organizations. No reputable physician divulges case histories of patients to the public or to other patients. A diagnosis of cancer must be based on evidence from biopsy, x-ray examination, or other recognized method. There is no blood test for cancer. A reputable physician welcomes and even encourages consultation with medical specialists.

Persons in need of treatment should consult the local medical society for help in selecting a doctor. Questions concerning cancer treatment methods may be referred to comprehensive cancer centers, such as Roswell Park Memorial Institute and Memorial Sloan-Kettering Institute.

UNPROVEN METHODS OF CANCER MANAGEMENT

Information on the following is available from the American Cancer Society:

Individual Statements:

Agpaoa, Antonio, "The Psychic Surgeon"
Anti-Cancer Factor in Clams (Mercenene)
Anticancergen Z-50 and Zuccala Lytic Test
Antineol
Bamfolin
H.H. Beard Methods
Bio-Medical Detoxification Therapy
Bonifacio Anticancer Goat Serum
Cancer Lipid Concentrate and the Malignancy Index
Carcin and Neo-carcin
Carzodelan
CH-23
Chaparral Tea
Chase Dietary Method
Clinica El Buen Samaritano
C.N.T. (Compleso Attivo Sulla Omeostasi Cellulare)
Collodaurum and Bichloracetic Acid Kahlenberg
Contreras Methods
Cresson Method
Crofton Immunization Method
Cytec System
Diamond Carbon Compound
Dotto Electronic Reactor
Electronic Devices
Ferguson Plant Products
Fonti Methods
Francis Diet
Fresh Cell Therapy
Frost Method
Ganner Petroleum or "Petroleum Pal"
Gerson Method
Gibson Method
"Grape [illegible]e"
H.11
Hadley Vaccine and Blood and Skin Test
Haematoxylon Dissolved in D.M.S.O.
Heat Therapy or Hyperthermia
Hemacytology Index (HCl)
Hendricks Natural Immunity Therapy
Hett "Cancer Serum" and Gruner Blood Smear Test
Hoxsey Method or Hoxsey Chemotherapy
Hydrazine Sulfate

Iscador
Issels Combination Therapy
Kanfer Neuromuscular or Handwriting Test
KC-555
Kelley Malignancy Index and Ecology Therapy
Koch Antitoxins
Krebiozen and Carcalon
Laetrile
Lewis Methods
Livingston Vaccine
M-P Virus
Makari Intradermal Cancer Test
Mininberg System
Mucorhicin
Multiple Enzyme Therapy
Naessens Serum or Anablast
Nicholas Escharotic Method
Orgone Energy Devices
Pap-Chek, Female Laboratory Testing
Polonine
Rand Coupled Fortified Antigen (RCFA)
 and Delayed Double Diffusion (3-D) Test
Revici Cancer Control
Samuels Causal or "Endogenous Endocrinotherapy"
Spears Hygienic System
Staphylococcus Phage Lysates or Lincoln Bacteriophage Lysates
Ultraviolet Blood Irradiation Intravenous Treatment
United Cancer Institute, Robert Cotti Vixon, M.D., President
Zen Macrobiotic Diet

Individual Statement on Proponent Organizations of Unproven Methods of Cancer Management:

Committee for Freedom of Choice in Cancer Therapy, Inc.
International Association of Cancer Victims and Friends, Inc.
National Health Federation

VITAMINS: Experiments with laboratory animals have shown that treatment with some vitamins can prevent the development of certain forms of cancer. However, to date there is no scientific evidence on the possible usefulness of vitamins in preventing or curing cancer in the human population.

THE NATIONAL CANCER PROGRAM

Begun with the National Cancer Act of 1971, the National Cancer Program is the largest ever taken against one category of disease. Since 1971, nearly 2 billion dollars has been spent by the Federal Government on cancer research and control.

The objectives of the National Cancer Program are to:

a) Develop the means to reduce the effectiveness of external agents for producing cancer.

b) Develop the means to decrease the risk of cancer development.

c) Develop the means to prevent the transformation of normal cells into cancer cells.

d) Develop the means to prevent the progression of cancer cells to cancers, and stop spread.

e) Develop the means to achieve an accurate assessment of risk, diagnosis, and prognosis of the disease.

Cancer centers and cancer control programs are two provisions made possible by the Cancer Control Act. Under cancer control programs the ACS and the NCI have on-going programs to aid the population; the newest of these is on detection of breast cancer.

CONCLUSION

In conclusion, cancer is one of the few major chronic diseases in which the individual plays such an important part in the outcome of the disease. Early detection and prompt treatment is necessary in many diseases, but it is especially important in the prognosis of cancer treatment. Logically, the urgency of reaching a capable doctor as soon as a danger signal persists is related to the knowledge the individual has gained through personal action or what he has been taught. If a person has been brought up with the attitude that cancer is "incurable" and that it is better not to know if you have cancer, this person will not have a very good probability of reaching a doctor early. However, introducing cancer education early in school, in a way which is not frightening, will eliminate "old wives' tales" and other falsehoods concerning cancer. The present generation of young people will be given information to be used for the rest of their lives which will prevent or insure early detection of cancer.

The use of this curriculum guide and training manual will vary from district to district, but the message of hope, early detection, prompt treatment and cure should be stressed throughout New York State.

PART II: SUPPLEMENTARY READINGS

IS CANCER CONTAGIOUS?

The announcement that scientists at the National Cancer Institute have isolated a human cancer virus has attracted attention to the question: Is cancer contagious? Other reports of "clustering" of Hodgkin's disease or leukemia patients who have had some form of contact with one another have also raised this question.

Basic to the idea that "cancer is catching" is the theory that viruses can cause cancer. While it appears that viruses may play such a role, it is also becoming clear that a virus needs to be "triggered" by another agent (a cocarcinogen) or some other circumstance to produce malignant disease. According to Dr. Robert Gallo, the director of the team that recently announced the discovery of a human leukemia virus, genetic factors and environmental influences must interact with the virus in a complex way that we do not yet understand.

Studies relevant to the causes of cancer are under way at the Institute, and the bulk of evidence at this time clearly indicates that cancer can in no way be considered contagious in the popular sense of the word. Quite simply, if it were infectious, we would experience cancer epidemics, just as we have flu epidemics, and cancer would spread like measles, polio, or the common cold. If cancer were contagious in the same way that other diseases are contagious, we could expect that the incidence of cancer among the families and friends of cancer patients and in the health professions would reflect their exposure to the disease. It does not.

Alleged proof that cancer is catching is supposedly offered by the existence of clusters of cancer patients who have at some time had contact, directly or indirectly, with each other. National Cancer Institute's epidemiologists maintain that these clusters do not reflect a greater incidence of cancer than would be found among a random survey of the general public. Another consideration that must be weighed is the impossibility of isolating the various factors that may be involved in causing cancer in a cluster group. Among people living in a specific geographic area, for example, it is not possible to eliminate environmental factors and cultural factors, such as diet and lifestyle, from the element of coincidental personal contact. Another imponderable in dealing with the onset of cancer is that we do not know the incubation time between "exposure" to causative agents and the manifestation of symptoms of the disease.

Certainly, it can be said with confidence that the fear of catching cancer is not warranted. Although future research may uncover new insights into the causes of cancer, it appears evident that cancer is not spread from person to person.

Source: Dr. John B. Maloney, Viral Oncology Branch, NCI

DOES CANCER RUN IN FAMILIES?

Familial aggregations of cancer have long attracted attention. Nearly everyone knows at least one person who has had several close relatives with cancer. However, cancer is a common disease and some such "clustering" of cases would be expected on the basis of chance alone. In studying this problem, the appropriate question is whether such clustering exceeds that to be expected on the basis of a random distribution of cases throughout the population and, if this is so, what is the magnitude of the excess risk among relatives of cancer patients?

Virtually every form of cancer which has been studied in the laboratory has shown an increased frequency in some species and strain of animals. It would be surprising if the same were not true for cancer in people. The results of animal work on strain differences in the risk of cancer suggest that human studies should consider familial patterns of risk for specific forms of cancer, as well as all forms combined.

The limited data available do suggest some increased familial risk of developing cancer of the same site for cancers of the female breast, stomach, large intestine, endometrium, prostate, lung, and possibly ovary. However, it is not known to what extent the observed familial aggregation of these tumors is due to genetic characteristics or to environmental factors, such as diet or occupation, which may remain the same from one generation to the next. Several "cancer family syndromes" have also been described in which family members present excess numbers of specific combinations of tumors such as adenocarcinomas of the colon, stomach, and endometrium; sarcomas and breast cancers; breast and ovary carcinomas; and brain tumors and sarcomas. It is interesting to note that these site combinations are similar to those which occur as multiple primaries within the same individual at frequencies higher than expected.

Brain tumors and sarcomas seem to occur more frequently than expected in brothers and sisters of children with these tumors. When an idential twin has childhood leukemia, the probability that the other twin will develop the disease within 1-2 years of the date of diagnosis of the first twin is about 1 in 5, a magnitude of risk far exceeding the prevailing level in the general population. Retinoblastoma, a rare form of cancer of the eye, is known to be due to a mutation inherited as an autosomal dominant. The nevoid basal cell carcinoma syndrome and pheochromocytoma with medullary thyroid carcinoma show similar patterns. In addition, several precancerous conditions including familial polyposis of the colon, neurofibromatosis, xeroderma pigmentosum, and albinism show marked hereditary patterns.

Although familial aggregations have not been demonstrated, some associations are known to exist between chromosome structure and malignancy. Persons with mongolism (Down's syndrome) have an extra chromosome and also are at excess risk of acute leukemia. Many individuals with chronic myeloid (granulocytic) leukemia have part of one chromosome missing (Philadelphia chromosome). Some associations between blood type and certain forms of cancer have been reported, but no assessment of the meaning of these observations is possible at this time.

CAT LEUKEMIA VIRUS

National Cancer Institute Virus Cancer Program scientists confirmed in 1964 the isolation of a cat leukemia virus. They demonstrated the ability of the virus to cause cancer in a variety of animals, including dogs, cats, and monkeys. They also showed that the virus could infect human cells grown in culture.

Because cats are closely associated with humans, a study was undertaken in the late 1960's to determine whether cat owners were at higher risk to leukemia than the general population. The study concluded that cat owners have no increased risk of developing leukemia.

THE VIRUS AND CANCER

Many infectious agents can be easily placed in well-established biological kingdoms. Bacteria, fungi, and the yeasts are classified in the kingdom of plants, while protozoa and worms are animals. What about viruses: are they plants or animals? Of themselves they are neither plants nor animals; they are, however, closely associated with either plant or animal life. Are they living? If one defines living things as entities capable of independent self-reproduction, then viruses are non-living. Actually, they stand on the edge of life. As intact particles outside the cell, they are like lifeless bits of inert matter, lacking the enzymes and energy for replication. When attacted to a cell and allowed to enter the cell, however, they come alive and set into motion the marvelous process of replication. Furthermore, they possess certain genetic properties which they perpetuate and maintain. In these respects, viruses are therefore similar to other living entities which multiply and retain their genetic integrity. We may look at viruses as living entities, very much dependent on the assistance of living cells which furnish them with the essentials for growth and multiplication.

Properties of viruses are as follows:

1) Viruses have definite shapes and structures.
2) Viruses are characterized by a definite size, but they differ in size. Some, such as poliovirus, are on the order of 30 millimicrons or less in diameter while others may approach 400 millimicrons -- a size approximating that of some bacteria.
3) Viruses are composed of known chemical substances, of which protein and nucleic acid (RNA and DNA) are the most important.
4) Viruses can change the life processes of a cell, causing injury, a modification in growth rate, or even death.
5) Some viruses infect a cell without causing any recognizable effect. In such an instance, the virus can remain dormant indefinitely or can be stimulated to multiply.
6) Some viruses are extremely sensitive to environmental conditions--temperature, ultraviolet light, etc.
7) Some viruses are fairly resistant to chemical and physical factors.
8) Some viruses are transmitted directly to their hosts; others require an intermediate host.

The first oncogenic virus to be discovered was that which induces myeloblastosis in chickens, reported in 1908 by Ellerman and Bang. Following this and the landmark isolations of viruses that caused chicken sarcomas by Rous in 1911, mammary adenocarcinomas in mice by Bittner in 1932, leukemias in murine animals by Gross in 1951, and multiple tumors in mice by Stewart and Eddy in 1958, a total of more than 110 viruses that induce tumors had been isolated by 1970 (Table 1). The information in the table shows that virtually every major group of vertebrates studied carries its own tumor viruses or is susceptible to those of others, and that many viruses have a surprisingly wide host range and induce most types of cancers seen in people. Indeed, some of these viruses not only replicate in human cells grown in tissue culture, but induce "cancerous" transformations (Table 2). This fact clearly establishes, philosophically and scientifically, that human cells are susceptible to viral oncogenesis, and it alerts investigators to the need to determine whether viruses solely or predominantly of subhuman animals may be oncogenic for man.

The origin of a wide range of animal tumors has been linked to infection by viruses. Chicken sarcomas and leukemias were the first tumors discovered to be caused by RNA tumor viruses. Since then, many types of tumors occurring in mice, cats, hamsters, monkeys, and other animals have also been shown to be associated with RNA viruses. Several animal tumors are caused by DNA tumor viruses such as the polyoma virus and SV-40. Herpes viruses, which are DNA viruses, are responsible for yet other tumors in frogs, chickens, monkeys, and rabbits. The outcome of infection by a particular virus depends on species, strain, and age differences in susceptibility of the host animal, and on hormonal status, route of infection, and specific immunologic factors. The presence of certain combinations of factors may be required to elicit tumors.

To date there has been no demonstration of viral etiologies for human cancers that meet the exacting standards of proof for experimental work. Since the viral genome may actively be incorporated into the host DNA and the latent period may be very long, an essential element in the chain of proof -- recovery of the virus -- is extremely difficult to achieve. Studies attempting to find evidence for viral causation of leukemia, breast cancer, sarcomas, and other tumors in man have so far yielded conflicting or equivocal findings.

An etiologic role for the Epstein-Barr virus, a type of herpes virus in Burkitt's lymphoma is judged probable by several investigators (EB virus has also been implicated in nasopharyngeal cancer). Burkitt's lymphoma may represent an unusual and infrequent response to a common infection, since EB virus is strongly associated with infectious mononucleosis. Cancer of the cervix, which recent work has linked to another herpes virus, HSV-2, is another site currently being studied for possible viral etiology.

It has been suggested that tumor induction may require the triggering of latent viruses in the cell by an external physical or chemical agent. With the development and refinement of new laboratory techniques, one may anticipate in the coming years more detailed and convincing documentation of the case for viral etiologies of at least a few human tumors.

Table 1. Viruses that Induce Neoplasms in Animals

Common Name of Virus	No. of Major Types	Host of Origin	Produces Neoplasia in:	Tumor Type in Animals
Mouse leukemia	16	Mouse	Mouse, rats, hamsters	Leukemia lymphoma
Mouse sarcoma	6	Mouse	Mouse, rats, hamsters, cats, tissue culture	Sarcomas
Polyoma	2	Mouse	Mouse, hamsters, rats, tissue cultures	All types except leukemia
Mammary tumor	2	Mouse	Mouse	Carcinoma
Chicken leukemia	4	Chicken	Chicken, tissue culture	Leukemia
Twiehaus	1	Chicken	Chicken, quail, hamster	Reticuloendotheliosis
Chicken sarcoma (Rouse et al.) (RSV)	9	Chicken	Chicken, quail, turkey, duck, hamster, monkey, snake, tissue culture	Sarcoma
Marek's (MHV)	1	Chicken	Chicken	Lymphoma
CELO	1	Chicken	Hamster	Sarcoma
Cat leukemia	4	Cat	Cat	Leukemia, lymphoma
Cat sarcoma	3	Cat	Cat, rat, dog, monkey, tissue culture	Sarcoma
G. pig leukemia	1	G. pig	G. pig	Leukemia
G. pig herpes	1	G. pig	G. pig	Sarcoma
Deer fibroma	1	Deer	Deer	Fibroma
Squirrel fibroma	1	Squirrel	Squirrel	Fibroma
Shope fibroma	1	Rabbit	Rabbit	Fibroma
Shope papilloma	1	Rabbit	Rabbit	Papilloma
Dog sarcoma	1	Dog	Dog, tissue culture	Papilloma
Dog mast cell	1	Dog	Dog	Carcinoma
Lucké	1	Frog	Frog	Carcinoma
Human adeno	31	Human	Hamster, mouse, tissue culture	Sarcoma-lymphoma
Wart	1	Human	Human	Papilloma
Hybrids	7	Monkey, Human Cat, Mouse	Hamster, cat, tissue culture	Sarcoma, lymphoma
Yaba	1	Monkey	Monkey, Human	Histiocytoma
H. saimiri	1	Monkey	Monkey	Lymphoma
Simian adeno	6	Monkey	Hamster, tissue culture	Sarcoma-lymphoma
SV40	1	Monkey	Hamster, mouse, tissue culture	Lymphosarcoma
Graffi hamster	2	Hamster	Hamster	Lymphoma, papilloma
Bovine papilloma	1	Cow	Cow, horse, mouse, hamster	Papilloma, fibroma, sarcoma
Bullhead papilloma	1	Fish	Fish (bullhead catfish)	Papilloma

Table 2. "Tumor" Viruses that Replicate and/or Transform Human Cells

Common Name of Virus	No. of Major Isolates	Type	Host of Origin
A. "Known Tumor Viruses"			
Chicken sarcoma	3	RNA	Chicken
CELO	1	DNA	Chicken
Mouse sarcoma	2	RNA	Mouse
Mouse leukemia	1	RNA	Mouse
H. saimiri	1	DNA	Monkey
Yaba	1	DNA	Monkey
SV40	1	DNA	Monkey
"Hybrids"	7	DNA	Monkey-Humans
Cat sarcoma	2	RNA	Cat
Cat leukemia	1	RNA	Cat
Human adeno (type 12)	1	DNA	Humans
EBV	2	DNA	Humans
B. "Suspect Tumor Viruses"			
Influenza	2	RNA	Humans
Sarcoma particle	2	("C")	Humans
Herpes-2	1	DNA	Humans
Herpes-1	1	DNA	Humans
Human breast particle		"RNA"	Humans
C. Other			
Shope papilloma	1	DNA	Rabbit
Monkey breast particle	1	"RNA"	Monkey

VIRUSES AND HUMAN BREAST CANCER - 1975

Almost 40 years have passed since Bittner's classic observation of an extrachromosomal factor in milk from certain strains of mice with a high incidence of mammary cancer was made. This factor was first named milk influence, then milk factor, then milk agent, and now it is known as the Bittner virus or the mouse mammary tumor virus (MMTV). Many years of extensive studies have led to the demonstration that this influence, factor, or virus is the cause of mouse mammary cancer providing all other factors are present, such as suitable genes of the host and hormonal factors controlled by the genetic background.

Morphological, biological, biochemical, and immunological studies of MMTV have led to the conclusion that this virus is the cause of mammary neoplasia in certain strains of mice. These studies have also shown that the virus is not only widely distributed among laboratory bred mouse strains with high and low incidences of mammary cancer, but that the virus can be transmitted from wild mice to the so-called artificial strains of laboratory mice. Thus, a uniformity of phenomena appears to be occurring in both wild and "domesticated" mice.

Recently two new viruses associated with mammary cancer in animals have been reported: One was found in a mammary carcinoma of a rhesus monkey -- the so-called Mason-Pfizer monkey virus (MPMV) -- and the other in a mammary tumor in a rat -- the R-35 virus.

Virus-like particles resembling those of MMTV particles have recently been demonstrated in spontaneous mammary tumors of collared lemmings by my colleague Dr. Shunkichi Hiraki. At the present time, however, evidence indicates that human breast cancer more closely resembles mouse mammary cancer than those observed in lemmings, rats, and rhesus monkeys.

The data available from experiments on mouse mammary cancer eventually led to studies of human breast cancer using techniques developed and perfected for the study of MMTV. This would not have been feasible without the ever-increasing interest in the possible viral origin of human breast cancer shared by clinicians, surgeons, and researchers. This interest was the result of the growing evidence implicating viruses in the origin of neoplasia in animals of most diverse species extending from mollusks to mammals, and from mice to non-human primates.

Current interest in the possible implication of a virus as a cause of human breast cancer may also be attributed to a desire for an additional approach to disease management besides that of surgery, radiotherapy, chemotherapy, and immunotherapy.

According to HEW's No. 4 Report on the End Results of Cancer (1974), the incidence of female breast cancer in the United States amounts of 11.8% of all cancers, and 28% of all female cancers. Thus, breast cancer is the most frequent type of cancer in women. Moreover, according to the American Cancer Society's 1974 Cancer Facts & Figures, of a total of 355,000 estimated deaths from cancer this year, 32,750 deaths will be from breast cancer. Further, according to this report, among the 655,000 estimated new cases of cancer in the United States this year, there will be approximately 90,000 new cases of breast cancer. Information of this type reflects the magnitude of the problem of breast cancer and emphasizes the urgency for an intensified research effort by clinicians and basic scientists in collaboration.

Before the possible implication of a viral agent in human breast cancer can be discussed, a brief description of the various properties of MMTV is necessary. Its structure differs from that of any other known RNA tumor-inducing virus. Sections of mouse mammary tumors or milk concentrates from various mouse strains revealed a characteristic biophysical, biochemical and immunological particle.

Investigations have conclusively shown that many strains of mice carry the virus from birth, but do not develop neoplasia until early or late middle age or very late age. The occasional appearance of this neoplasia at a comparatively young age is an exception. The virus can be identified morphologically, immunologically, and biochemically in tissues of young mice, as well as in the milk of young females long before symptoms of neoplasia are observed, if ever. This viral behavior immediately suggests that other factors, internal as well as external, are involved in the final appearance of the disease. The virus is, therefore, widely distributed in many if not most tissues, including the milk of female mice as well as in some tissues of male mice, such as the seminal vesicles.

It is known that the virus can be transmitted sexually by males to females, who in turn transmit it to their progeny by way of their milk. These findings may have an implication in human breast cancer on the assumption that they are relevant to the presence of a viral factor in human breast cancer. If male transmission occurs in human breast cancer, there is an obvious need to analyze the paternal side for any meaningful evidence of a familial factor in female breast cancer.

Biophysical and biochemical studies of MMTV have demonstrated that this morphologically characteristic particle has other important features. They include a buoyant density of 1.18 gm/ml to 1.22 gm/ml; an enzyme, the so-called RNA-directed DNA polymerase (now known to be an integral part of all tumor-inducing viruses of the RNA type); and a heavy molecular weight RNA (35S-70S), which is characteristic of all tumor-inducing viruses. This particle is present in both tumor tissue and in the milk of many female mice.

Immunological studies carried out by ourselves and others have demonstrated that mice prone to mammary cancer are by no means tolerant of MMTV. Various strains of mice carry antibodies to the virus and to the tumor cells induced by the virus. In addition to these virus-specific and tumor-specific antibodies, these mice harbor a wide spectrum of antibodies, including heterophile and embryonic tissue antibodies, as a result of the appearance of mammary neoplasia. These antibodies can be shown by every technique available for demonstrating humoral and cell-mediated immunity. Some strains of mice contain the antibodies before symptoms of the disease become clinically recognizable. It should be pointed out, however, that in spite of the presence of specific antiviral and antitumor antibodies, the progression of neoplasia apparently continues unhampered.

Again it should be stressed that the virus is widely distributed in various strains of mice, whether the incidence of mammary cancer is high or low, and that the virus is present not only in tumor tissues but in other tissues of tumor-bearing mice. It is also present in varying numbers in the milk of these mice long before the clinical symptoms of disease appear. This by no means detracts from its essential role in the origin of mammary neoplasia, but points out that with this type of neoplasia (as is probably the case with most types of cancer) other factors, such as genetic, hormonal, and environmental factors, must be active before the breast cancer appears.

Although the MMTV was discovered in 1936, it took many years before the virus was truly characterized and its part in the development of mouse mammary cancer was clearly delineated. Although the search for virus particles in human breast cancer tissues and in human milk started more than 20 years ago, neither the techniques nor the necessary data were then available and we still remember our own disappointment with the inconclusive results. To a newcomer in this field, it is understandably difficult to comprehend the slow progress of mouse mammary cancer research and application of the findings to the study of human breast cancer. Such conclusions first required the development of techniques and methodology in electron microscopy, tissue culture, biochemistry, biophysics, and immunology for a rational approach to a search for a human breast cancer virus. Indeed, the first meaningful findings in the search for virus particles in human breast cancer and milk were reported only five or six years ago. Immunological, biochemical, and biophysical studies soon followed.

Thus, we come tothe question of whether currently available information possibly implicates a viral agent in human breast cancer. Results of electron microscopy have demonstrated the presence of human virus particles strikingly similar to those of MMTV in 34% of biopsy specimens taken from a group of women with breast cancer. The particles were also found at a low incidence in the milk of some women with breast cancer and in the milk of some apparently normal women. In view of the different techniques applied to the study of human milk, it is difficult to estimate with any accuracy how often virus particles are present. However, in both milk and biopsied tumor specimens, the number of virus particles observed has been disappointingly low when compared with the number of virus particles found in mouse tumors and milk -- except in genetically heterozygous mice that are outbred. Virus particles in these mice are rather infrequent and this may be a clue to some of the results. Nevertheless, virus particles resembling MMTV have been observed in human breast cancer and in human milk.

Results of immunologic studies have demonstrated the presence of fixed immunofluorescent antibodies in over 60% of sera of breast cancer patients, in 40% of sera of some of their relatives, and in 15% of sera of some apparently normal women. As in the case of mouse sera, human sera give positive fixed immunofluorescence tests with their own tumor cells as well as with cells of homologous tumors. Further, the antibodies present in the sera of breast cancer patients give a positive fixed immunofluorescence test with mouse mammary cancer cells.

Suitable absorption tests of the positive sera have demonstrated that the reaction is due to tumor tissue and virus-specific antibodies. Apparently breast cancer patients have antibodies elicited by an agent immunologically similar to the mouse mammary tumor agent. Further, the sera of breast cancer patients have a neutralizing effect on MMTV. These sera contain antibodies that form a specific precipitate with the mouse virus in mouse cancer cells. Immunoelectron microscopy shows that the sera also contain antibodies that specifically label mouse virus particles by horseradish peroxidase.

In addition to humoral antibodies, breast cancer patients exhibit cell-mediated immunity as demonstrated by the leukocyte migration inhibition test. This test has shown the presence of an antigenic component in human breast cancer tissue similar to that of MMTV.

Biochemical studies by a number of workers have demonstrated the presence of particulate material in some human milk which contains (as do known RNA tumor-inducing viruses) a high molecular weight RNA (60S-70S) with poly-A sequences (200 nucleotides). These studies also point to the similarity of an enzyme of MMTV, the so-called RNA-dependent DNA polymerase, to that present in human milk. Both biochemical properties are characteristic of MMTV. It should be mentioned, however, that such biochemical data do not conclusively establish the viral nature of the particles in human milk or their causative relationship to human breast cancer.

The results of extensive molecular hybridization studies have demonstrated that RNA (so-called polysomal or pRNA) from human breast cancer cells and from human milk exhibit homology with RNA from MMTV. RNA from human breast cancer cells also hybridizes with DNA of MMTV. This implies that human breast tumor cell RNA is specifically homologous to MMTV RNA.

Spiegelman and his associates, by applying the biochemical technique described as the simultaneous detection test, have demonstrated the presence of particles with RNA-directed DNA polymerase and 70S RNA in human breast cancer tissues just like those they demonstrated in mouse mammary tumor tissues. Further, the DNA product of this polymerase hydridizes to the RNA of MMTV.

Evidence suggests that human breast cancer, like mouse mammary cancer, is a multifactorial disease, involving the interplay of genetic, hormonal, and possibly environmental factors. The virus may act as a trigger for the disease process but by itself may not be sufficient for oncogenesis.

In summary, all the findings described, while strongly suggestive, do not provide final proof of viral etiology of human breast cancer.

Questions may be raised about the possibility of applying the morphological, immunological, and biochemical tests as supplements to mammography and thermography in identifying breast cancer. In our opinion, the combined methods can be applied only as research techniques. Much more study is needed before they can be considered of clinical diagnostic value.

As for the possibility of preventive measures such as vaccination against breast cancer (based on the assumption that a virus -- or viruses -- is one of the factors involved in human breast cancer), it should be pointed out that no vaccination procedures have as yet been devised that would effectively prevent the appearance of spontaneous mammary cancer in mice of inbred (homozygous) or even outbred (heterozygous) strains.

However, recent observations of the inhibitory effect of rifamycin derivatives or of streptovaricin on the RNA tumor virus enzyme (reverse transcription) provide a hopeful outlook for the future application of antiviral substances in chemotherapy of human breast cancer.

Leon Dmochowski, M.D., Ph.D.

CYSTIC DISEASE, FIBROCYSTIC DISEASE OF THE BREAST

Cystic disease, sometimes referred to as fibrocystic disease or chronic cystic mastitis, is a common cause of benign lumps and hard areas in the breast. It is seen chiefly in women 35 to 50 years of age and it usually regresses after the menopause. The condition tends to involve both breasts, and multiple cysts of many sizes are common. It is characteristic for the breast to have a "cobblestone" feel. Unlike malignant tumors, cysts are usually movable, spherical in shape, and relatively soft. They may enlarge and become tender just prior to the menstrual period. An x-ray examination (xeroradiography or mammography) may assist the physician in distinguishing these benign cysts from cancerous tumors.

Experience has shown that cystic disease is associated with an increased risk of subsequent breast cancer. However, the malignancies that occur in these patients rarely arise from a cyst. Nevertheless, women with cystic disease should be examined frequently. It is recommended that cysts that do not fluctuate in size or that are otherwise suspicious be biopsied and/or surgically removed. Neither x-ray therapy nor hormones are recommended for treating breast cysts. In fact, hormones prescribed for other reasons may aggravate the cystic condition. If this occurs, modification of the hormone dosage may be necessary.

MARIJUANA AND LUNG CANCER

It is not our goal in this manual to write a volume on drug education, but the other health aspects related to smoking marijuana should be mentioned.

The many laboratories around the world including the Orchard Park Lab of Roswell Park Memorial Institute have proven through many thousand experiments risks involved with smoking tobacco. In the search for "safer" smoking materials, researchers have found that during the combustion of most leaves, compounds are formed which can cause cancer in experimental animals. For example, when maple, lettuce, and cabbage leaves were dried, smoked, and tested for carcinogenicity, experimental animals continued developing tumors. Of the three, the condensate of lettuce smoke had the least hazardous effects.

Similar experiments have been conducted using marijuana leaves as the burning product and the same results have been observed. Carcinogenic products are produced as in the tobacco, maple, cabbage, and lettuce leaf experiments.

It is speculation at this time whether a heavy smoker of marijuana would ever reach the high dose necessary to cause lung cancer as experienced by thousands of cigarette smokers. Many marijuana smokers also smoke cigarettes and this will increase the risk of those particular individuals.

THC, the active ingredient of marijuana has been used experimentally in anti-tumor research activity. Scientists have reported that THC was effective against the Lewis lung carcinoma of mice and one or two other experimental mouse tumor systems. While the Medical College of Virginia scientists have reported up to 36 percent increased lifespan in mice with Lewis lung carcinoma, this represents only "borderline" activity by National Cancer Institute standards. Institute scientists believe that a 50 percent increase in the lifespan is a better indication of antitumor effect.

Tetrahydrocannabinol and crude extracts of marijuana have been tested by the National Cancer Institute against the L-1210 and P-388 mouse tumors, animal systems that are used routinely by Institute researchers in screening substances for anticancer activity. Both THC and the extracts were inactive in these tests. The National Cancer Institute has not tested THC against the Lewis lung carcinoma, however, and this and other tests are now being considered.

In any case, the THC as used in experiments is not comparable to the habit of smoking marijuana. With present knowledge, smoking marijuana does not discourage tumor growth in man.

HORMONES AND CANCER

Steroid (sex) hormones have an essential role in the growth, differentiation and function of many tissues in both animals and people. It is established by animal experimentation that modification of the hormonal environment by gonadectomy, by pregnancy or by exogenous administration of steroids can greatly increase or decrease the spontaneous occurrence of tumors or the induction of tumors by applied carcinogenic agents. In people also, there is evidence that differences in endogenous hormone levels may be associated with differences in tumor incidence. It is possible, therefore, that the incidence of human tumors could be increased or decreased by a specific mode of exogenous hormone administration, but this cannot be predicted.

For an administered estrogen seriously to perturb the hormonal environment of people, the intake must be of the same order as, or greater than, the amounts of estrogens produced endogenously. The intake of steroids for effective contraceptive medication has to be sufficient to disturb the hormonal environment, and in fact such a disturbance is a requisite of fertility inhibition. The possibility that a carcinogenic risk may be involved in such medication must therefore be considered. For example, the minimum effective dose of diethylstilbestrol for mammary carcinogenesis in mice is of the same order as the doses used for therapy in women. At the same time, it should be remembered in regard to both estrogens and progestins in contraceptive medication that the steroid hormones of pregnancy have actions similar to those of the contraceptive agents.

Animal Data

Administration of the natural estrogens increases the incidence of tumors in a number of organs in a variety of animal species. Data on the synthetic estrogen diethylstilbestrol indicate that this compound has a comparable carcinogenic potential and there is no evidence to suggest that its carcinogenic properties are due to some special biological function other than its estrogenic activity.

The majority of experimental animal treatments with estrogens, which have resulted in carcinogenesis, have been at very high dose levels. There is inadequate information at present, however, to indicate the minimum dose requirements, and thse could be much lower than those commonly employed in animal studies.

In the case of the natural progestin, progesterone, there is not much evidence that it has a carcinogenic potential *per se*. There is, however, evidence that low doses of progesterone administered over long periods act in combination with carcinogenic agents such as some viruses or chemicals. In part, therefore, the hazard of long-term administration of synthetic progestins is comparable with that associated with progesterone in increasing the incidence of tumors due to other agents. This is dependent on the degree of progestational activity possessed by the compound in question relative to its other hormonal characteristics.

The synthetic progestins, such as norethynodrel and norethisterone, have some carcinogenic potential in animal systems even when administered alone. This is increased by combination with estrogens. The progesterone analogue, chlormadinone acetate, has not demonstrated carcinogenic properties when given alone to rodents. When combined with estrogens, its carcinogenic potential appears to parallel that of the estrogenic component.

There is no evidence at present to suggest that steroid hormones are ultimate carcinogens; on the contrary, all the evidence suggests, that they act, in part at least, by modification of pituitary hormone secretion in which prolactin is a factor. In general, it appears that steroids increase the probability of tumor occurrence in those tissues normally responsive to stimulation by such steroids.

Human Data

Steroid hormones have been and are used extensively in human therapy. When they are used for the treatment of disseminated cancer such as that of the breast, prostate and endometrium, their effect on tumor growth and the severity of side-effects are the major considerations. In the use of steroid therapy for less vital reasons (for example, menstrual disorders, menopausal syndrome, pregnancy maintenance, osteoporosis, protein anabolism, gonadal deficiency), however, the question of carcinogenic hazard becomes more pertinent. With the continuing development of steroid use for contraception, the question of possible carcinogenic hazards has become of major importance.

At the present time no attempt can be made to interpret the animal data directly in terms of human risk since no objective criteria are available to do so. There is, therefore, no substitute for direct observation in the human being, although the animal experimentation provides important clues as to where one should look for human risks. Epidemiological studies to explore the possibility of a carcinogenic effect of administered estrogens and progestins in people, however, suffer from two major difficulties. Firstly, the interval between the commencement of administration and the possible appearance of cancer is likely to be long. Secondly, to detect a small or moderate change in risk, observations on very large numbers of subjects are required.

With these reservations in mind the following can be said:

Diethylstilbestrol

Beginning in the late 1940's, diethylstilbestrol (DES) was prescribed for some pregnant women to prevent miscarriage. DES has been found effective after intercourse in preventing pregnancy and the FDA has approved its use as a "morning after" pill in emergency situations. A much higher dosage was formerly used to avert miscarriage.

Recent research studies have indicated that daughters of mothers who received such estrogens during pregnancy may be at risk of developing "clear cell adenocarcinoma" of the vagina or cervix. Clear cell adenocarcinoma is a rare type of cancer that has an unusual glandlike appearance when viewed with a microscope. The risk of developing this or other medical conditions as a result of DES exposure has not yet been firmly established. These conditions include nonmalignant vaginal irregularities, such as vaginal adenosis, and minor cervical changes.

The National Cancer Institute recommends that daughters who may have been exposed before birth to a synthetic estrogen should contact the physician who treated the mother in pregnancy for verification. They should obtain information about the specific kind of estrogen given, the dosage, the period of pregnancy involved, and conditions for which the estrogen was prescribed.

Whether or not verification of DES exposure is possible, all young women past the age of puberty who think they have been exposed are advised to undergo a complete pelvic examination by a gynecologist or other qualified physician. Such an examination should include a complete inspection and palpation of cervix and vagina, a Pap Test, an iodine staining test, and a biopsy of selected area where indicated. A colposcopic examination (with a special instrument for direct examination of the vagina and cervix) may be performed in certain cases.

DES in Animal Food

The only association that has been definitely established between DES and human cancer relates to its ingestion at high-dose levels during pregnancy as a medication to prevent miscarriage.

The use of DES as a feed additive is reported to lead to the presence of detectable residues in 1 percent of the samples of beef liver that have been analyzed. The doses that are present in such residues have been of 2 parts per billion or more. In a single 150 g (5-ounce) serving of beef liver, the intake would be about 0.3 microgram. It should be noted that DES has not been detected in any other edible portions of animals in which DES was detected in the liver. The extent of use of liver in the diet varies. There is no scientific evidence to date to indicate increased incidence of cancer due to consumption of diethylstilbestrol residues in meat products.

There is far more chemical substance capable of causing cancer in tobacco smoke than there is in the occasional sample of liver found to be contaminated with DES. Since exposure to such sources of carcinogens are largely matters of personal choice, they can, therefore, be avoided.

We believe that the Food and Drug Administration is in the best position to provide additional information, should you desire it. Their address is 5600 Fishers Lane, Rockville, Maryland 20852.

Other Estrogens

The administration of estrogens for treatment of the menopausal syndrome and related conditions has not been shown to be associated with a risk of cancer.

Oral Contraceptives

The administration of these preparations has not as yet been shown to alter the risk of cancer of the breast. The evidence with respect to cancer of the cervix is somewhat less consistent.

CHEMOTHERAPY

There can be no doubt that the development of a substance which could stop the growth of human cancer cells without harming normal cells would represent an enormous advance in cancer therapy. The anticancer drugs currently available are limited in their usefulness primarily by two factors: (1) Toxicity, that is, damage to normal cells and tissues as well as cancer cells and tissues; and (2) gradual loss of drug effectiveness due to resistance developed by the patient. Approximately 40 drugs are currently in use.

Drug	Major Indications
Alkylating Agents:	
Busulfan (Myleran)	Chronic granulocytic leukemia.
Chlorambucil (Leukeran)	Chronic lymphocytic leukemia, Hodgkin's disease, non-Hodgkin's lymphoma, trophoblastic neoplasms.
Cyclophosphamide (Cytoxan)	Hodgkin's disease and other lymphomas, multiple myeloma, lymphocytic leukemia, many solid cancers.
Mechlorethamine (nitrogen mustard; HN_2, Mustargen)	Hodgkin's disease and other lymphomas, bronchogenic carcinoma.
Melphalan (l-phenylalanine mustard; Alkeran)	Multiple myeloma, malignant melanoma, ovarian carcinoma, testicular seminoma.
Thiotepa (triethylenethiophosphoramide)	Hodgkin's disease, bronchogenic & breast carcinomas.
Antimetabolites:	
Cytarabine hydrochloride (arabinosyl cytosine; Cytosar)	Acute leukemia.
Fluorouracil (5-FU, FU)	Breast, large bowel, and ovarian cancer.
Mercaptopurine (6-MP, Purinethol)	Acute lymphocytic and granulocytic leukemia, chronic granulocytic leukemia.
Methotrexate (amethopterin; MTX)	Acute lymphocytic leukemia, choriocarcinoma, carcinoma of cervix and head & neck area, mycosis fungoides, solid cancers.
Thioguanine (6-TG)	Acute leukemia.
Plant Alkaloids	
Vinblastine sulfate (Velban)	Hodgkin's disease and other lymphomas, solid cancers.
Vincristine sulfate (Oncovin)	Acute lymphocytic leukemia, Hodgkin's disease & other lymphomas, solid cancers.

Drug	Major Indications
Antibiotics:	
Adriamycin (Doxorubicin)	Soft tissue, osteogenic & miscellaneous sarcomas, Hodgkin's disease, non-Hodgkin's lymphoma, bronchogenic & breast carcinoma, thyroid cancer.
Bleomycin (Blenoxane)	Hodgkin's disease, non-Hodgkin's lymphoma, squamous cell carcinoma (head and neck), testicular carcinoma.
Dactinomycin (actinomycin D; Cosmegen)	Testicular carcinoma, Wilms' tumor, rhabdomyosarcoma, Ewing's and osteogenic sarcoma, and other solid tumors.
Mithramycin (Mithracin)	Testicular carcinoma, trophoblastic neoplasms.
Mitomycin C (Mutamycin)	Squamous cell carcinoma of head and neck, lungs and cervix; adenocarcinoma of stomach, pancreas, colon, rectum; adeno- & duct cell carcinoma of the breast.
Other Synthetic Agents:	
Dacarbazine (DTIC-Dome; DIC)	Metastatic malignant melanoma.
Hydroxyurea (Hydrea)	Chronic granulocytic leukemia.
Mitotane (ortho para DDD o.p' DDD; Lysodren)	Adrenal cortical carcinoma.
Procarbazine hydrochloride (Methyl hydrazine; ibenzmethyzin; Matulane)	Hodgkin's disease, non-Hodgkin's lymphoma, bronchogenic carcinoma.
Hormones:	
Diethylstilbestrol (DES)	Breast and prostate carcinomas.
Dromostanolone propionate (Drolban)	Breast carcinoma.
Ethinyl estradiol	Breast and prostate carcinomas.
Fluoxymesterone	Breast carcinoma.
Hydroxyprogesterone caproate	Endometrial carcinoma.
Medroxyprogesterone acetate	Endometrial carcinoma, renal cell, breast cancer.
Prednisone	Acute and chronic lymphocytic leukemia, Hodgkin's disease, non-Hodgkin's lymphomas.
Testolactone (Teslac)	Breast carcinoma.
Testosterone enanthate	Breast carcinoma.
Testosterone propionate	Breast carcinoma.

RADIATION THERAPY

The use of radiation in cancer therapy is based on the fact that cancer cells are more sensitive to x-rays than are cells in surrounding normal tissue. Usually, the greater the degree of malignancy of the cancer growth, the more sensitive it is to radiation therapy.

Most frequently used in radiation therapy are x-rays, radium, and artificial radioisotopes. X-rays are electromagnetic waves similar to light, but they have a much shorter wavelength. Radium is a naturally occurring radioactive element that releases alpha particles, beta particles, and gamma rays. Radioactive isotopes releasing beta particles and/or gamma rays are used for many diagnostic and therapeutic purposes. Many of the radioactive materials used can be produced artifically in an atomic reactor. They have the identical chemical properties of the original material but differ in atomic weight.

Radiation therapy may be divied into: (1) external radiation therapy; and (2) internal radiation therapy, including intracavitary radiation, interstitial implants, and systemic radiation therapy.

External Radiation Therapy. External radiation therapy is given with x-ray machines or large radioisotope sources (so-called bombs). X-ray machines produce voltages that range from thousands to millions of volts. In general, the higher the voltage the greater the penetration of the x-rays. Consequently, low voltages, such as 50 kv., may be used for skin cancers, while voltages of at least 200 kv. are used for deep-seated cancers. Radiation therapy with voltages of more than 800 kv. is called supervoltage therapy. Its main advantage is that it can deliver larger doses of radiation to deep-seated tumors with less effect on overlying structures.

Among the most common machines that produce supervoltage x-rays are the linear accelerators, the Van de Graaff generators, the betatron, and the cobalt 60 or cesium 127 bombs.

Recent years have seen the advent of many improvements in radiotherapeutic techniques. Improvements in tumor localization, beam direction, dosimetry (determination of amount of tissue doses), and planning of field sizes have been made so that greater benefits are obtained with less harm to the patient.

External therapy may be given for cure or for palliation. Curative radiation therapy is used in the treatment of lymphomas and cancers of the larynx, nasopharynx, skin, mouth and cervix. For palliation, external radiation therapy often produces excellent, if temporary, tumor regression and relief from pain and other pressure symptoms.

Internal Radiation. Intracavity radiotherapy is most commonly used in the management of cancer of the uterus. Radioactive elements such a radium (^{226}Ra), cobalt (^{60}Co), iridum (^{192}Ir), and tantalum (^{182}Ta) are used for removable implants; those such as radon (^{222}Rn), gold (^{198}Au), and iridium (^{192}Ir) are used for permanent implants. Removable implants are either in needle form or in plastic tubes sutured into the cancer.

For interstitial radiotherapy, needles containing radioactive material such as radium or small "seeds" of gold containing radon are inserted into and around a cancer in a solid organ such as the tongue.

Radiactive isotopes such as iodine 131 (^{131}I), phosphorus 32 (^{32}P) and gold 198 (^{198}Au) are used either orally or I.V. for certain types of chronic leukemia, effusions, myeloma, and cancer of the thyroid.

CANCER IMMUNOTHERAPY

Several observations suggest that immunologic factors influence the natural course of cancer in people. Spontaneous regression of cancer -- well - documented in some cases -- and the more frequent survival of patients for long periods in what appears to be a biologic equilibrium between cancer and host suggest some form of control, possibly immunologic. More direct evidence comes from histologic findings: certain primary tumors are infiltrated by lymphocytes, plasma cells, and macrophages. This has been most frequently studied in patients with breast cancer, and the cellular infiltrates have been associated with a favorable prognosis. These are examples of observations that suggest that immune reactions can eliminate cancer or retard its progress. On the other hand, there is also evidence that an impairment of immunologic capacity increase the susceptibility to cancer and accelerates its growth.

The use of immunosuppressive agents to prevent the rejection of grafted organs in people has provided further support for the existence of immunologic surveillance that rids the body of incipient neoplastic cells and may continue to function, although with less efficiency, in restraining clinically evident cancer.

Given what we know about tumor antigens, and of the immune responses they elicit, what can we say about the possibilities of immunotherapy? As with many other diseases, prevention would appear to be a more effective weapon than the treatment of cancer once it has become established. In the future there may in fact be hope of preventing cancer by vaccination with tumor viruses or by immunization with tumor antigens, but at the present time we are far from being able to think in terms of preventing human cancer by immunologic methods.

The use of certain microorganisms or their products has been explored as a means of raising the level of immune responsiveness. A variety of agents, including Bacillus Calmette Guerin (BCG), corynebacterium parvum, and zymosan are known to increase the resistance of animals to certain bacterial and viral infections and to histoincompatible skin grafts as well as to decrease the prevalence and ameliorate the course of certain experimental tumors.

The results of studies with BCG vaccine have been encouraging but additional experience is needed to evaluate the BCG vaccine's effective use in humans.

The first data to prove that malignant diseases can be eradicated by control of immune factors were obtained from work in skin cancer. Local administration of tumor agents permits manipulation of superficial tumors and adjacent tissues without major adverse changes in the overall status of the host and his defense mechanisms. Cutaneous tumor models therefore make it possible to study the effect of immunologic factors on the course of tumors and to develop immunotherapeutic approaches to malignant disease.

Induction of delayed hypersensitivity reactions at tumor sites was shown to result in selective reactions against premalignant and malignant epidermal lesions and to lead to their eradication. Early lesions, otherwise clinically undetectable, become apparent by their response to immunologic challenge, thus permitting diagnosis and treatment. Furthermore, differentially more intense immune reactions result in destruction of premalignant lesions, preventing their progression to the frankly malignant state.

BLOOD TESTS FOR CANCER?

Currently, the only reliable method of diagnosing cancer is biopsy, the microscopic examination of suspect cancer. Scientists have long sought reliable screening tests for cancer, which would make possible early diagnosis on a wide scale. So far, no such tests have been developed, but interesting leads have been found.

A method for measuring the level of CEA (carcinoembryonic antigen) in the blood is being used in combination with other established medical procedures for the diagnosis and management of colorectal and lung cancer. It is not intended as a screening test to detect cancer, because the test has given falsely normal results in some patients known to have cancer. Furthermore, increased amounts of CEA have been reported in the blood of patients suffering with various inflammatory diseases or other health problems not associated with cancer.

It has been suggested that the CEA assay may be useful as an early indication of recurrence in some patients previously treated for cancer. At this time, however, it must be emphasized that the assay alone is not a conclusive test either for the initial diagnosis of cancer or for monitoring disease recurrence.

Another fetal antigen which is looked upon as potentially useful in cancer diagnosis is alpha-1-fetoprotein. This substance is routinely found in the fetal gut, but the amount of circulating protein decreases with age. It may be an indicator of liver, pancreatic, and intestinal malignancies.

With the advent of sensitive radioimmunoassays, certain hormones can be measured whose hypersecretion is associated with various tumors. ACTH, when elevated, may be an indicator of pituitary tumors; chorionic gonadotropin may provide a key to the existence of uterine tumors.

It should be stressed that all of these tests are in the experimental stage and are not suitable as mass screening techniques.

CYCLAMATES

In October 1969, on the basis of advice from scientists in the National Cancer Institute and the Ad Hoc Subcommittee on Non-nutritive Sweeteners of the Food Protection Committee, Food and Nutrition Board, National Academy of Sciences-National Research Council, the then Secretary of Health, Education and Welfare, Robert Finch, announced a ban on cyclamates for inclusion as artificial sweeteners in beverages for general use and in the processing of general purpose foods.

In October 1969, Abbott Laboratories reported that suspicious papillary bladder lesions were appearing in some of the animals in two year feeding studies then underway. These studies were of the 10:1 mixture of sodium cyclamate and saccharin, supplemented with cyclohexylamine during the second half of the studies, in Wistar rats, and of cyclohexylamine in Charles River albino rats. At the completion of the study of the 240 Wistar rats on the highest doses of both compounds, eight (seven males and one female) had tumors. Of the 17 Charles River rats fed the highest daily dosage of cyclohexylamine, one had a bladder tumor. Furthermore, all the rats fed the cyclamate mixture were shown to be cyclohexylamine excretors. None of the 80 control Wistar rats had bladder lesions.

The preliminary findings were reported to the NAS-NRC Ad Hoc Subcommittee on Non-nutritive Sweeteners convened in October 1969, which immediately recommended removal of cyclamates from the GRAS list. Thereupon Secretary Finch moved to ban this product as already stated.

In December 1973 the FDA received a new petition to consider cyclamates as a sage food additive. The Agency will review all the evidence submitted in the petition and then will submit the entire document to the NAS-NRC committee for its review. The petition has been made available for public inspection in the Office of the Hearing Clerk, FDA.

No decision to approve or disapprove the petition will be made until the NAS-NRC committee issues its evaluation and a full and public discussion of all the scientific facts and opinions has occurred. The final decision concerning the use of cyclamates will be based on the totality of scientific data.

PART III: FACT SHEETS

Cervical Cancer

Cancer of the sex organs is more common to women than it is to men. As a woman, you're probably concerned about this. The thought of cancer probably scares you to death. But did you know that cancer in the sex organs is one of the most curable diseases? Let's talk about some other facts you should know about cancer in the sex organs.

It will be helpful if we talk about the sex organs first:

The sex organs, or reproductive organs, of the woman include the ovaries, where the egg for reproduction is made; the fallopian tubes which start close to the ovaries and form a path to the womb, or uterus. The uterus is where the baby grows when a woman is pregnant. The cervix is the opening from the uterus into the vagina. The vagina is the female organ of intercourse.

What are the reproductive organs made of?

The smallest building block of the body is a cell. Healthy cells grow and divide in an orderly way. Healthy cells grow to form a healthy and useful body tissue, or body organ, and are under the control of the body. Sometimes cells grow that are not healthy and are not under the control of the body. Cancer cells are an example of these. Cancer cells do not grow and divide in an orderly way. They grow into masses of tissue which invade and replace normal cells and organs.

Where do cancer cells grow in the reproductive organs?

The most common place is the cervix. If the cancer is not found or not treated, it can grow and spread to other reproductive organs and to other body organs.

Perhaps you've heard of a pap test and may wonder what it is.

A pap test, or pap smear, is a test which finds cancer of the cervix (or cervical cancer) in its earliest and most curable stages, or while it is still just abnormal cells growing on the surface of the cervix. It is named after the man who developed it - Dr. George N. Papanicolaou. It is a very simple, quick, and painless examination (most women don't feel anything at all!). The pap smear can be done in a doctor's office or a clinic.

Is once enough?

No. Cancer can start to grow at any time. Because these cells grow slowly, a yearly pap smear will find the cells before they have a chance to spread. If every woman had a yearly pap test, cervical cancer would be discovered in early, curable stages. (Your birth date is a good reminder!)

How is a pap smear done?

Living cells are collected from the vaginal fluid and by gently scraping the surface of the cervix. The cells are then spread on a microscope slide and sent to a laboratory where they are carefully examined by people who have been trained to recognize abnormal cells.

What can a pap smear reveal?

A pap smear can uncover any abnormal cells in the reproductive organs. These abnormal cells often result from infections in the vagina, but if cancer cells are there, they will also be found. If the pap smear reveals cells suspicious of cancer, the doctor confirms the diagnosis with a biopsy, which is the removal and examination of bits of tissue from the suspected area.

I can hear someone saying: "Is a pap test really that important to me? I feel fine!!"

Yes it is!! You can save your life! A yearly pap test will warn you early enough to give you a nearly perfect chance of being cured if cancer is found. Therefore, a pap smear can prevent all deaths from cervical cancer. And if you don't have cancer, it gives you a great feeling to know that you don't have it.

Now we know about the pap test, but what harm will the cancer do if it isn't found or treated?

If cancer isn't treated, after awhile it will destroy the organ where it started. Cancer in the reproductive organs usually starts at the cervix. The cancer can invade and also destroy other organs in the same area, or if cancer cells get into the blood, they can be carried to other, more distant, organs of the body. In each new place, they begin new, destructive tumors.

Besides the pap test, is there any way I can tell if I have cervical cancer?

It isn't easy, because there are no visible symptoms or signs in the earliest stages of cervical cancer. As the cancer grows and becomes more destructive, you may notice that you have unusual bleeding or discharge. The includes prolonged menstrual periods, a heavier menstrual flow, bleeding between periods, or bleeding after you have experienced the change of life. These symptoms could result from many things. If cancer is the cause it may be too late to cure the cancer.

The safest thing is not to wait for the symptoms of cervical cancer, but to be absolutely certain you don't have cancer before you do have the symptoms. Fortunately, we have the pap test which can find cancer of the cervix long before the symptoms occur, and when the cancer is in its most curable stages.

If cervical cancer is found, how is it treated?

There are two methods to treat cervical cancer: through surgery, or by x-ray therapy. Treatment varies for each patient. Remenember, discovering the cancer early and treating it is the best way to keep you alive. Your pap test can be your best friend!

Cancer of the Colon and Rectum

The most common internal site of cancer, cancer of the colon and rectum will strike about 99,000 Americans this year, more than 90% of them over 40 years of age. It afflicts men and women in about equal numbers.

The colon (or large bowel) and rectum form the lower end of the digestive tract. Their function is to extract liquid from the remains of digested food and to hold the solid waste matter until ready to be expelled from the body. Cancer sometimes arises from the cells which form the walls of the intestine.

Approximately half the people with colon-rectal cancer will die of it - an unnecessarily high number. When detected in its earliest stage, over 80% of colon-rectal cancers are successfully treated. Fortunately, a method exists which made possible early detection of most cancers in the colon and rectum.

Using an instrument called a proctosigmoidoscope, a physician can visually examine the lower 12 inches of the bowel, where the majority of cancer occur. He may also detect, and remove through the examining instrument, possible pre-cancerous growths called polyps. Not all polyps become malignant, but because removal is so easy, many doctors do so routinely.

Therefore, the best protection against cancer of the colon and rectum is an annual physical examination, including a proctosigmoidoscopic examination for everyone over 40. Patients should insist that their doctor perform such an exam.

A recently developed device, called the fiberoptic colonoscope, shows even more promise for early detection and removal of cancerous or precancerous polyps. A physician trained in the use of this instrument can examine the entire length of the colon and detect early cancers which sometimes are not revealed in x-ray studies. The instrument can also be used to remove any suspicious growths with much less discomfort and inconvenience to the patient than would be caused by abdominal surgery. This device should become generally available over the next few years.

The most effective treatment for cancer of the colon and rectum is surgery. The operation consists of removing the part of the bowel containing the tumor along with contiguous segments on both sides. The lymph nodes that drain the area also are removed because the lymph system is one of the main routes for metastasis.

When the operation involves extensive surgery of the rectum, a temporary or permanent opening called a colostomy can be made in the abdominal wall to permit elimination of body wastes. Bowel function is not impaired by this operation, and after adjusting to some inconvenience, the patient with a colostomy can lead an otherwise normal, active life.

Colon-rectal cancer can strike anyone, particularly above the age of 40. Detected early, it is a highly curable disease. The best protection against cancer of the colon and rectum is an annual physical which includes a proctoscopic examination.

Cancer of the Pancreas

The pancreas is a long, narrow organ located under and behind the stomach. The organ is highly specialized, carrying out both digestive and endocrine functions. Some of its cells produce the hormone insulin, while other cells produce digestive enzymes.

In the United States, incidence and mortality from pancreatic cancer are steadily increasing. It now ranks fourth as a cause of cancer deaths. Although the causes of cancer of the pancreas are not fully understood, causative factors may include smoking, alcohol, and occupational exposure to carcinogens.

Because the pancreas is located deep within the abdominal cavity, early diagnosis of pancreatic tumors is difficult. Thus, pancreatic cancer is often diagnosed at an advanced stage when clinical symptoms appear. Depending on the part of the pancreas that is involved, the patient may turn yellow (jaundiced), lose weight, have digestive system disturbances, and abdominal pain. Exploratory surgery of the pancreas is known as a laparotomy.

Initial treatment usually consists of surgery (removal of all or part of the pancreas). However, the disease is often not amenable to surgery and may then be treated with chemotherapy alone or in combination with radiation therapy. The drug 5-fluorouracil (5-FU) has been used with some success in the treatment of this disease. Clinical studies are now being conducted by the National Cancer Institute to explore the usefulness of combined treatment with drugs, radiation, and surgery.

Thyroid Cancer

Cancer of the thyroid is a relatively rare form of the disease, accounting for approximately 1 percent of the total cancer incidence. Even when diagnosed at a regional stage (not localized), five-year survival rates are close to 90 percent. It appears that patients treated for thyroid cancer who survive five years have a normal life expectancy.

The cause or causes of thyroid cancer are not known. However, its incidence is greater than would normally be expected among a group of people who, in childhood, received x-ray treatments to the head and neck area. These treatments were common in the 1940's and 1950's, especially in the Midwest, and were designed initially to shrink enlarged tonsils and adenoids to avoid surgery.

Most tumors of the thyroid gland are discovered accidentally by the patient who notices a swelling in the neck. Thyroid cancers produce no systemic symptoms unless they alter the production of thyroid hormone which rarely occurs. Enlargement of the tumor may result in hoarseness and/or discomfort when swallowing. Lymph nodes in the neck may also be enlarged. A recently developed laboratory test which measures the blood level of the hormone, calcitonin, makes it possible to diagnose a certain type of thyroid cancer prior to surgery.

Physicians also use a radiologic technique called "scanning" to diagnose this disease. After the patient swallows radioactive iosine (I^{131}), a scintillation counter is used to determine the distribution of radioactivity in the thyroid gland. Cancerous tissue "takes up" the radioactivity less well than normal tissue. However, similar results have been seen when the nodule is benign.

Surgery is the treatment of choice for all types of thyroid cancer, and is often followed by radiation treatments to destroy any remnants of diseased tissue. Therapeutic doses of radioactive iodine may be administered in thyroid cancers of certain cell types.

No drugs or combination of drugs have been demonstrated to be effective in the treatment of thyroid cancer.

Wilms' Tumor

Wilms' tumor, a type of kidney cancer found in early childhood, has been reported in infants as young as 6 1/2 months. It is the second most common abdominal malignant solid tumor of childhood in the United States. About 500 cases are discovered annually, comprising 20 percent of all cancers in children. The peak incidence is at three or four years of age, and both sexes are affected equally. The presence of an enlarged abdomen, noticed either by a parent or a physician during a routine physical examination, is usually the first symptom of this disease. Diagnosis is made by x-ray (intravenous pyelogram).

Prior to the development of pediatric surgical techniques, the disease was invariably fatal. The addition of radiation therapy and chemotherapy to surgery has resulted in a striking improvement in survival rates.

In 1969, the National Wilms' Tumor Study Group (NWTSG) was established to study the long-term effects of treatment for this disease. Three National Cancer Institute Cooperative Clinical Study Groups combined efforts to establish the NWTSG: Acute Leukemia Group B, Children's Cancer Study Group A, and the Southwest Cancer Chemotherapy Study Group. Physicians associated with other institutions who were not members also joined in the effort to treat the disease and analyze the results of treatment methods.

Preliminary data from the NWTSG and other investigators indicate good results for advanced disease with chemotherapy combined with surgery and radiation. Chemotherapeutic agents which show promise are Actinomycin D, vincristine, and Adriamycin. The use of these drugs in various combinations has been most encouraging.

Testicular Cancer

Cancer of the male sex glands or testes, is the most common form of the disease in patients 15-34 years old. The overall incidence rate in the United States is only 2.1 per 100,000 males. As with many cancers, certain population groups have increased or decreased risks. This disease is extremely rare in blacks, Africans, Asians, and in New Zealanders. There is a higher incidence in men whose testes never fully developed, or have not descended completely.

This form of cancer usually shows as a painless mass, and may be confused with an inflammatory condition. Any change from normal in shape or size of the testes should be brought to the attention of a doctor.

Carcinogens in People

Chemicals:

Polynuclear hydrocarbons: soots, pitch, coal tar and products; creosote, shale, mineral, petroleum and cutting oils, cigarette, cigar, and pipe smoke.

Aromatic amines: 2-naphthylamine, benzidine and derivatives, 4-biphenylamine, 4-nitrobiphenyl, auramine and megenta

Nickel carbonyl

Isopropyl oil manufacture (process discontinued)

Betel nut, mass, tobacco chewing

Chromates, inorganic arsenicals, asbestos

Benzene?

Mycotoxins (e.g., aflatoxin), Senecio alkaloids, plant carcinogens?

Vinyl chloride

Radiation:

Ionizing radiation

Solar (ultraviolet) radiation

X-rays

Nuclear fission products

Uranium

Radon

Radium

Viruses:

Yaba

Epstein-Barr Virus?

Herpes-Simplex 2?

"C" type viruses?

Hormonal Imbalance:

Estrogen?

APPENDIX A

EXCERPTS FROM:

BREAST SELF-EXAMINATION

A Teacher Training Guide

American Cancer Society, New York State Division
August 1974

I. What Is Cancer?

This section attempts to provide trainees with the confidence and ability to answer simple non-medical questions about breast cancer directly and accurately and to know when to refer the questioner to her physician. An outline to aid the physician in his/her talk consists of the following six topics:

A. What is cancer the disease?

Basically, it is abnormal and accelerated cell growth. Researchers are trying to determine which cancers are caused by viruses, chemical irritants, heredity, emotional stress, immune-response breakdown, etc. Cancer is many different diseases.

B. Physiology of the breast

(Consult the diagram on page 76. The entire page can be duplicated and handed out to trainees, if desired.)

C. What is risk?

A high risk group in this case is a category of women who are more likely to develop breast cancer than the average population. A woman who falls into such a category is said to be "at risk". At present the most clearly established high risk groups are women over 40 and women with maternal family history of breast cancer.

D. Detecting abnormalities

In addition to palpation, there are three breast cancer detection methods in use today: thermography, which measures the heat differential in breast tissue; mammography, an x-ray procedure, detects differences in density in the tissue; and xerography, essentially the same as mammography but with a different type of "picture". Thermography, mammography, and xerography are not routinely available to date. Physician referral is required.

E. Physician's standard response to a suspicious lesion

When a woman sees a doctor about an abnormality she has detected in her breast, he will usually examine her breast via one of the three methods mentioned above. If there appears to be reason to suspect a malignancy, he will do a biopsy which, if positive, will be followed by the treatment (usually surgery). Removal of the breast is called mastectomy, or radical mastectomy when it includes the removal of underlying muscle tissue and the axillary lymph nodes. If cancer is present and the lesion is localized, early detection and prompt treatment saves lives.

F. The Role of Breast Self-Examination (BSE)

Close to 95% of the cases of breast cancer that are treated are discovered by the woman herself, who can feel from the inside as well as the outside. Until detection by x-ray is available the way the Pap test is today, BSE will probably continue to be the most important means of early detection.

II. A Sample Demonstration

This section describes the recommended BSE program in sufficient detail to serve as a training model. It can be employed as a hand-out for trainees. Although each of the topics listed below should be included, the narrative discussions need not be recited verbatim. This Sample Demonstration is meant for use as a guide; not as gospel. Sections in brackets are instructions to the BSE teacher trainee, not narrative proper.

Keep in mind that the order in which the eight sections are presented is subject to the BSE teacher's discretion depending on her audience. Furthermore, group discussion on any of the topics should be encouraged and can occur spontaneously at any time without disturbing the overall impact of the program. Indeed, we heartily recommend supporting lively group discussion whenever it develops.

The recommended BSE demonstration includes the following topics:

1. BSE Self-Help Quiz (optional)
2. Facts about breast cancer
3. Body responsibility
4. Cultural barriers to practicing BSE
5. How to do BSE
6. Questions and answers
7. Hand-out materials

This may appear lengthy, but the topics flow logically and easily with a little practice. The following pages describe these topics in more detail.

1. BSE Self-Help Quiz (optional - See Appendix)

(If time is available, this can be used to spark interest in the group. The teacher can ask if the group wants to go over the answers immediately or wait until the end of the program.)

2. Facts about breast cancer

One out of 15 women in the U.S. will develop breast cancer at some time. This is frightening, but fear is our worst enemy. Early detection can save your life. Although the overall cure rate is 40%, if breast cancer is found early (before it spreads) the cure rate is 85%. So, it really pays off to examine your breasts every month and see a doctor immediately if you detect any changes.

Some women need to be especially alert to breast cancer and conscientious about practicing BSE monthly. They are women with a maternal history of breast cancer (in mother, sister, maternal grandmother, etc.) and women over 40 years old. This is not meant to alarm you, but only to make you more aware. Keep in mind that 80% of breast changes are benign, not cancerous.

3. Body responsibility

95% of breast abnormalities are found by the women herself and not by her physician. Thus, an annual or semi-annual checkup by a physician is not enough. I am my doctor's best diagnostic tool. I need to become more aware of my body changes; more responsible to myself, as well as more helpful to my doctor.

I know what is normal for me - do you? We are all different. Breasts are different. Some breasts are lumpy naturally. For some, inverted nipples are normal. The key to BSE is in detecting breast changes, so we must first know what is normal for us. Remember, 80% of the time a lump or other change is not cancer.

4. Cultural barriers to practicing BSE

Generally, Americans share a common taboo against touching our bodies in certain ways. There is something vaguely bad, dirty, sinful, (add your own words) about touching your breasts in a gentle deliberate manner. (Share stories with the group about touching ourselves. Perhaps begin with your own amusing story.)

What do your breasts mean to you? What are breasts for? (attract men; nurse babies.) Share stories about the fashionable female figure over the years: the flapper look (flat chested), sweater girl (pointy), up-lift. the-bigger-the better (falsies), no-bra look (spend $10 to look bra-less!)

Many participants will be able to remember fashions of the past. Over one billion dollars have been spent to advertise breast products in the last decade. How much has been spent to talk about breast care?

(The most powerful barrier to practicing monthly BSE is fear. A common feeling is "If I find something and its cancer .... I'd rather not know about it," and "I'd rather be dead than have a mastectomy." These feelings often arise in the discussion. If not, you can share your own honest feelings when you first heard about BSE. It is important that these feelings are brought out in the open because they can sabotage the teacher's goals. When the group's fears are aired, agree that it is scary. Don't say "there is nothing to worry about." Emphasize that women successfully recover from mastectomies both physically and emotionally.

For those BSE teachers who feel comfortable using Role Play techniques, the expression of fear of "finding something" is an ideal opportunity to use role-playing. Let the participant imagine what it would be like to find a lump .... going to the doctor ... etc. The key factor in handling fear in the group is the teacher's honest, candid and supportive response. (See Appendix.) Also it is important that the teacher knows when not to respond. Often other members of the group will support a statement, validate a feeling, or sympathize with the speaker. The more the group is involved, the less the teacher has to say.

5. How to do BSE

BSE should be done once a month after the menstrual period, when any breast swelling has receded. For some people the breasts tend to be lumpy at various times during the month. These are transitory changes which could alarm women unnecessarily. For this reason it is wise to practice BSE 5-7 days after the menstrual period began and not at other times.

BSE has two parts: visual inspection and palpation (touching).

a. Visual inspection

Sit in front of the mirror disrobed. Inspect your breasts for changes: puckering, dimpling, nipple formation, discoloration or moles, vascular structure, patchy skin, unusual hair growth, any discharge. An individual's breasts are not symmetrical or identical. Look at the contour of your breasts from the front and the side. You know what your breasts look like.

Raise your arms above your head. Inspect for changes in this new position.

b. Palpation

Sit or stand and place the arm of the breast being examined behind your head. Think of the breast as the face of a clock with 12 o'clock at the top and 6 o'clock at the bottom. With the flat of your fingers press gently but firmly in a rotating motion. Start at the "12 o'clock" position and follow each number of the clock around in concentric circles until you reach the nipple area. Be sure to examine all areas of the breast including the armpit area. At the "6 o'clock" position you will feel a thickening or ridge. Don't be alarmed. This is normal.

This procedure should be repeated lying down with a pillow or folded towel behind the shoulder of the breast being palpated.

6. Questions and answers

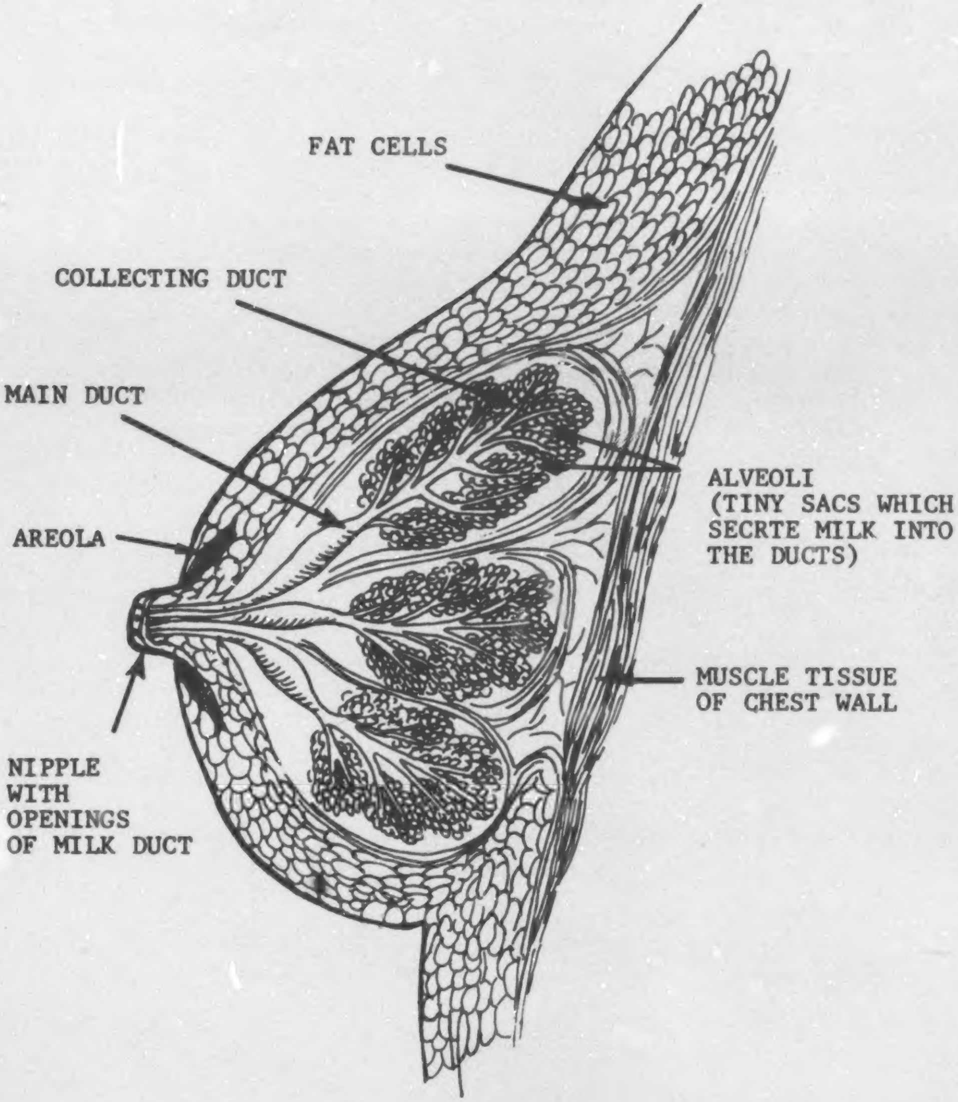
Many people have questions concerning the following topics: heredity, trauma to the breast, breast feeding and risk, bra-less fashion, large breasted women, lumpectomy. What are your questions?

(Be careful not to answer questions about methods of treatment. Often people will relate personal experiences with a physician, hospital, etc. Do not contradict anything a woman's doctor may have told her and do not offer any medical opinions. If she is concerned, urge her to consult her doctor.)

7. Hand-out materials

PHYSIOLOGY OF THE BREAST

The breast is composed of glandular (milk-secreting) tissue and a large amount of fatty tissue. It is subject to many benign conditions, the most common being the formation of fluid-filled sacs (cysts) in the milk ducts. In the normal aging process the glandular tissue is gradually replaced by progressively more fatty tissue.


FAT CELLS
COLLECTING DUCT
MAIN DUCT
AREOLA
ALVEOLI (TINY SACS WHICH SECRTE MILK INTO THE DUCTS)
MUSCLE TISSUE OF CHEST WALL
NIPPLE WITH OPENINGS OF MILK DUCT

QUESTIONS AND ANSWERS

The questions listed below were developed by two experienced BSE teachers on the basis of group responses they had encountered. The questions were answered by John Benfield, M.D., Professor of Surgery, U.C.L.A., School of Medicine; Elmer Broen, M.D., Clinical Professor of OB/GYN, U.C.L.A. School of Medicine; and Richard Gold, M.D., Assistant Professor of Diagnostic Radiology, U.C.L.A., School of Medicine.

1. MY DOCTOR CHECKS ME EVERY SIX MONTHS. WHY ISN'T THAT ENOUGH?

   It just isn't practical for a doctor to see every female patient more frequently unless there is a specific reason to do so. Self-examination at monthly intervals permits a woman to get to know her own breasts and detect abnormalities between visits to her doctor.

2. MY DOCTOR ONLY CHECKS ME LYING DOWN, BUT YOU SAY WE SHOULD CHECK LYING DOWN AND SITTING UP. WHY DOESN'T MY DOCTOR DO IT BOTH WAYS? WHY SHOULD I?

   A physician can usually do a very adequate examination with the patient lying down, as the breast tissue is then most evenly and thinly distributed. The value of the sitting position is in the visual examination; and some doctors believe that the region directly behind the nipple is more easily palpated when the woman is seated. A woman examining her breasts should do a visual examination while seated or standing and palpation in both sitting and lying down positions, simply in order to be as thorough as possible.

3. IS A CYST EVER MALIGNANT?

   Almost all cysts are benign and remain benign; the problem lies in distinguishing a fluid-filled cyst from a solid cancer. Also, cancers can occur adjacent to cysts. Very rarely, a benign intracystic papilloma may become a malignant intracystic carcinoma - but that is an extremely rare occurrence.

4. DOES A MALIGNANT TUMOR MOVE?

Most cancers tend to undergo striking local invasion of breast tissue and tend also to cause the breast to form scar tissue in and around the cancer. This combination of events results in "fixation" of the cancer, or a loss of mobility. Benign processes such as fluid-cysts or solid fibroadenomas (solid fibrous growths) tend to be more mobile because they neither invade the surrounding breast tissue nor cause the breast to deposit scar tissue in their vicinity. Upon occasion, however, a cancer may be as mobile as a benign lesion. This is why surgical removal is usually the only sure way of determining that a lump, especially a solitary lump, is not a cancer.

5. CAN A BENIGN CYST OR A TUMOR TURN MALIGNANT?

Rarely. A benign tumor called a papilloma can rarely form in the wall of a cyst. Rarely this papilloma can become a malignant papillary carcinoma. So, an intracystic carcinoma is a combination of two rare events, which makes it very, very rare! (See answer to question 3). We can say, however, that women with benign breast masses probably have a slightly higher risk of cancer than women who have never had any breast masses.

6. I HAVE HAD A BIOPSY THAT TURNED OUT BENIGN. WILL ANY OTHER TUMOR I GET BE BENIGN?

This cannot be predicted in individual cases. Statistically, about 8 out of 10 breast lumps are pathologically benign.

7. HOW OFTEN SHOULD I HAVE A MAMMOGRAM?

The use of mammography to detect early breast cancer in women over the age of 35 who are at risk is becoming more widespread, though it is still not a routine measure. The long term effect of radiation exposure to the breast is not yet known; however, new techniques that reduce radiation exposure while showing greater detail are now becoming available. Most physicians will recommend mammography if there is an abnormality or special indication.

8. I NORMALLY HAVE LUMPY BREASTS. HOW CAN I DETERMINE THE DIFFERENCE BETWEEN MY NORMAL CONDITION AND AN ABNORMAL LUMP?

You can't. Regular breast self-examination will lead you to become familiar with the pattern of lumps in your breasts; any variation in this pattern should be evaluated by a physician. Your doctor may want to see you as often as every three months if you have this condition.

9. I HAVE HAD A MASTECTOMY. HOW OFTEN SHOULD I HAVE MAMMOGRAPHY?

Because of the increased risk of developing breast cancer in the other breast, many physicians recommend mammography on an annual basis, with more frequent physical examinations.

10. MY MOTHER HAD BREAST CANCER. WHAT ARE MY CHANCES OF GETTING IT?

The woman with a maternal family history of breast cancer (mother, maternal aunt or grandmother, sister) is considered to be a high risk category. Without a full family history, however, it would not be possible to pin down the exact statistical difference in risk.

11. IF I NURSE MY CHILDREN, DO I HAVE LESS CHANCE OF GETTING BREAST CANCER?

Yes, to a small degree. However, this slight decrease in risk should not influence decisions regarding the pros and cons of breast feeding. A more significant factor is age at the time of delivery of your first child. The younger you were, (i.e., teen-age) the less chance you have of developing breast cancer.

12. I HAVE INVERTED NIPPLES. IS THAT ANY CAUSE FOR CONCERN?

Generally speaking, no. They are subject to infection if not kept clean and dry, but do not seem to be related to an increased incidence of breast cancer.

13. MY FATHER HAD CANCER OF THE BREAST. DOES THIS MEAN I MIGHT HAVE CAUSE TO WORRY?

It's possible, but adequate statistics are not available since not enough men have breast cancer to form a sizable statistical base.

14. IF THE TUMOR IS MALIGNANT, IS IT SAFE TO JUST REMOVE THE LUMP? IF NOT, WHY NOT?

Please refer to page 15 of "1974 CANCER FACTS AND FIGURES", and to the "American Cancer Society Policy Statement on Surgical Treatment of Breast Cancer."

15. IS BREAST CANCER TRANSMITTED FROM THE MOTHER'S OR FATHER'S SIDE?

As far as we now know, breast cancer is "familial" only through the maternal side of the family.

16. I HAVE ALWAYS HAD A DISCHARGE FROM MY NIPPLES. IS THERE ANY WAY THAT THE FLUID CAN BE TESTED FOR CANCER?

There is such a thing as a Pap smear of the breast, where fluid is withdrawn from the ducts of the breast through the nipple. This test is still being evaluated and is not generally available.

17. OF THE TWO, XEROMAMMOGRAPHY AND THERMOGRAPHY, WHICH IS MORE RELIABLE? IS IT NECESSARY TO HAVE BOTH?

Xeromammography and thermography are not competitive procedures, but actually complement each other. For example, some small carcinomas are detected by xeromammography that may not be detected by thermography and vice versa. Thermography by itself is unreliable because a positive thermogram may result from benign or malignant breast disease. But, the combination of xeromammography (or film mammography) with physical examination and thermography has resulted in a striking increase in the detection of early breast cancer.

18. WHAT IS CHEMOTHERAPY? WHAT IS COBALT? HOW ARE THEY USED TO CURE CANCER?

Chemotherapy is the treatment of cancers with drugs. It is not usually used in the treatment of breast cancer unless there has been metastasis. Cobalt is a form of radiation. Both treatments act by destroying tumor cells.

19. IF I GET CANCER IN ONE BREAST, DOES THAT MEAN THAT I WILL GET IT IN THE OTHER ONE?

No, but there is an increased risk of developing cancer in the remaining breast. This risk is estimated to be at least 5 times greater than that of the normal population of women.

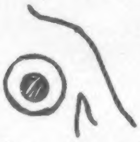
20. WHY IS RADIATION GIVEN BEFORE SURGERY?

It usually isn't. Some physicians have conducted clinical trials with pre-operative radiation, but the results to date do not indicate any improvement in cure rates as compared to operations without previous radiation.

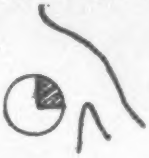
A SELF-HELP TEST ON BREAST SELF-EXAMINATION

A B C 1. What part of the breast is most frequently the site of a malignancy?

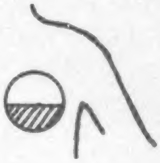
(A)



(B)



(C)



A B C 2. What is palpation?

(A) Rapid Heartbeat; (B) Touching; (C) Butterflies in the Stomach

A B C 3. Why is it important to go to your doctor immediately if you discover an abnormality?

(A) Early treatment could save your life; (B) You may forget about it if you wait too long; (C) Doctors need the business

A B C 4. Why should you look at yourself in the mirror as part of your breast self-examination process?

(A) To be sure you're doing it properly; (B) Some abnormalities can be seen; (C) To check your muscular development

T F 5. In 95% of all breast cancer cases, the woman discovers her own lesion.

T F 6. It doesn't matter if you use a towel under the shoulder during breast self-examination

T F 7. It is not abnormal to feel a ridge in the lower part of the breast

T F 8. Cystic mastitis is the formation of cysts in the ducts of the breast

T F 9. Any abnormal discharge from the nipple is something to see your doctor about

T F 10. Almost all breast abnormalities are cancerous

T F 11. Seven out of every hundred (or one in fifteen) women will develop breast cancer

T F 12. Heredity and/or other factors may influence the likelihood of any woman developing breast cancer

If you missed . . . 0 - 3: You're very knowledgeable!
3 - 6: Great potential - keep at it!
6 - ?: Let's hit the books!

And Remember . . . If you feel there are large gaps in your knowledge, there's still time to ask questions, questions, and more questions.

CORRECT ANSWERS TO A SELF-HELP TEST ON BREAST SELF-EXAMINATION

1. B
2. B
3. A
4. B
5. True
6. False
7. True
8. True
9. True
10. False
11. True
12. True

BREAST SELF EXAMINATION TRAINEE TEST

Instructions: Circle the best answer to each of the following questions. Some questions have more than 1 correct answer.

1. Which childbearing history reflects the lowest risk of developing breast cancer?

    a. Had first child at 25 years of age; breast-fed the baby.
    b. Had first child at 16 years of age; bottle-fed the baby.
    c. Had first child at 18 years of age; breast-fed the baby.
    d. Had first child at 31 years of age; breast-fed the baby.

2. My doctor checks me every six months. Is that enough?

    a. No, breast tissue may undergo changes during the interval between between the doctor's examinations.

    b. It's not necessary for a woman to examine her breasts in between visits to her doctor.

3. It is wise for a woman to consider her chances of getting breast cancer before deciding if or when she will have a child and if she will breast-feed.

    a. True
    b. False

4. Should breast palpation be done both lying down and sitting up?

    a. Only the doctor needs to check both ways.

    b. A woman examining her breasts should visually examine her breasts either in a standing or sitting position and palpate her breasts both lying down and in a seated position.

    c. It is sufficient for women to visually examine their breasts.

5. A woman with inverted nipples should be especially alert to the possibility of developing breast cancer.

    a. True
    b. False

6. Is a cyst ever malignant?

   a. A cyst is usually not malignant.

   b. Often a benign intracystic papilloma becomes a malignant intracystic carcinoma.

   c. The doctor's diagnostic problem is distinguishing a fluid-filled benign cyst from a solid cancer.

7. Is risk increased if the father develops breast cancer?

   a. No. Hereditary tendencies are transmitted only through the maternal side of the family.

   b. Perhaps, but we do not have adequate statistics to determine this.

   c. Yes, but the risk is negligible.

8. Does a malignant tumor move?

   a. All malignant tumors of the breast become fixed or immobile because they invade local breast tissue.

   b. Benign cysts and solid fibrous growths tend to be mobile.

   c. Benign cysts and solid fibruous growths tend to be fixed.

9. In cases of operable breast cancer the American Cancer Society recommends removal of the entire involved breast because:

   a. Local excision (lumpectomy) has not been scientifically proven to be as effective.

   b. Cancer can arise simultaneously in different parts of the same breast.

   c. The Halsted radical mastectomy or modified radical mastectomy has been preferred by surgeons for many years.

   d. At present, it is not possible to determine if the cancer has spread, and if so, to what extent.

10. Can a benign cyst or tumor become malignant?

    a. Breast cysts do not become malignant.

    b. Sometimes in rare instances, a benign papilloma which has formed in the wall of a cyst becomes malignant.

    c. Sometimes cysts are malignant.

11. What is a Pap smear of the breast, and where can a woman obtain it?

    a. It is a microscopic examination of mother's milk to detect cancer; obtain it from an obstetrician.

    b. It is a test for cancer using biopsied breast tissue; obtain it from a surgeon.

    c. It is a microscopic examination of fluid from the nipple to detect cancer; it is still experimental and not widely available.

    d. It is a test for cancer using fluid from the nipple; obtain it from a gynecologist.

12. I have had a benign biopsy. Will any other tumor I get be benign?

    a. This cannot be predicted in individual cases.

    b. Yes.

13. If a thermogram is negative, is mammography a waste of money?

    a. No. It is wise to be thorough.

    b. Yes. Thermography is a reliable diagnostic method.

    c. Yes. X-rays are only necessary if other symptoms are present.

    d. No. Thermography enhances the effectiveness of mammography in detecting early breast cancer.

14. How often should I have a mammogram?

    a. Once a year.

    b. If you are considered high risk and 35 or older, annually.

    c. Mammography should be used only if there is an abnormality or special indication such as being at risk.

15. Xeromammography and film mammography are complementary procedures.

    a. True

    b. False

16. In normally lumpy breasts how can a woman determine the difference between a normal condition and an abnormal lump?

    a. The woman can't.

    b. Regular BSE will help a woman become familiar with her pattern of lumps. With this information, she can seek medical evaluation of any variation in her pattern.

17. What characteristic does chemotherapy and cobalt have in common?

    a. Both are taken by mouth.

    b. Both destroy tumor cells.

    c. Both are radioactive.

    d. Usually, both produce side effects.

18. How often should a mastectomy patient have a mammography?

    a. No more often than a non-mastectomy patient.

    b. Due to increased risk of developing breast cancer in the remaining breast her physician may recommend annual mammography.

19. Is it foolish to worry about breast cancer if one breast already has been removed?

    a. No. The risk of developing breast cancer in the remaining breast is 5 times greater.

    b. No. One never knows about the other breast.

    c. Yes. Your chances are cut in half.

    d. Yes. You shouldn't worry about things over which you have no control.

20. My mother's mother had breast cancer. What are my chances of getting it?

    a. There is no relationship.

    b. Maternal family history of breast cancer increases one's risk.

    c. If your mother's mother had breast cancer your chances are greatly reduced.

BREAST SELF EXAMINATION TRAINEE TEST

Answer Sheet

1. c
2. a
3. b
4. b
5. b
6. a
7. b
8. b
9. a, b, d
10. b, c
11. c
12. a
13. a, d
14. c
15. b
16. b
17. b, d
18. b
19. a, b
20. b

APPENDIX B

Periodicals

Materials cited in these appendixes should be evaluated by the teachers prior to use with students. The following articles have not been evaluated. Students should be referred to the Reader's Guide to Periodical Literature for additional titles.

Breast Cancer

"I Was a Cancer Coward", Ebony, vol. 26, p. 64, Sept. 1971.

"Early Warning System" (xeroradiography), Time, vol. 98, p. 41, Dec. 27, 1971.

"Detecting Breast Cancer", Redbook, vol. 141, p. 40, July 1973.

"What Women Don't Know About Breast Cancer", Consumer Reports, vol. 39, pp. 264-268, March, 1974.

"Breast Cancer - Fear and Facts", Time, vol. 104, pp. 107-110, Nov. 4, 1974.

"Comeback After Cancer", Family Health, pp. 22-42, March 1974.

Pollution

"Asbestos Town Struggles with a Killer", Saturday Review of Society, vol. 1, pp. 26-31, March, 1973.

"Each Glass Is Another Moment of Truth" (asbestos in water), Today's Health, vol. 51, pp. 44-49, Oct. 1973.

"Chlorination Threat", Time, vol. 104, p. 123, Nov. 25, 1974.

"Flourides in the Air", Environment, vol. 15, pp. 25-32, April 1973.

"Sunlight and the SST", Saturday Review of Science, vol. 1, p. 81, April 1973.

"Rising Dangers of Atomic Wastes", U.S. News and World Report, vol. 75, pp. 30-32, Sept. 10, 1973.

"Cancer and Ecology", Newsweek, vol. 80, pp. 97-99, July 10, 1972.

Industrial Cancers

"Asbestos Under Fire", New Republic, vol. 167, pp. 13-15, July 8, 1972.

"Plastic Peril" (PVC), Time, vol. 103, p. 64, May 13, 1974.

Periodicals (Cont'd.)

"Hidden Plague", New York Times Magazine, Oct. 27, 1974, p. 20.

"Asbestos - The Deadly Side", New York Times Magazine, Jan. 21, 1973, p. 12.

"Annals of Industry: Casualties of the Workplace", The New Yorker, Oct. 29, 1973, pp. 44-106; Nov. 5, pp. 131-150; Nov. 12, pp. 87-149; Nov. 19, pp. 126-179; Nov. 26, editorial.

Diet and Cancer

"Danger of Cancer in Food" (regulation controversy), Saturday Review, vol. 53, pp. 47-49, Sept. 5, 1970.

"Behind the Meat Counter - The Fight Over DES", Atlanta, vol. 230, pp. 86-89, Oct. 1972.

"Red Food Coloring - How Safe?", Consumer Reports, vol. 38, pp. 30-33, Feb. 1973.

"Roughage in the Diet", Medical World News, vol. 15, pp. 35-42, Sept. 6, 1974.

"Cancer vs. What You Eat", Science Digest, pp. 10-14, March, 1974.

Cancer Research

"Immunotherapy", Newsweek, vol. 75, pp. 55-56, April 6, 1970.

"Cancer Breakthrough - CEA Test", Life, vol. 70, pp. 28-31, April 23, 1971.

"Cancer Virus Theories", Science, vol. 177, pp. 44-47, July 7, 1972.

"New Gains in War Against Cancer", U.S. News, vol. 73, pp. 38-42, Dec. 4, 1972.

"Drugs Against Cancer", Newsweek, vol. 85, pp. 52-53, April 7, 1975.

"Secret Weapon Called Immunology", N.Y. Times Magazine, Feb. 17, 1974, p. 10.

"Herpes Virus and Cancer", Scientific American, vol. 229, pp. 26-33, Oct. 1973.

"Toward Cancer Control" (immunotherapy), Time, vol. 101, pp. 64-69, March 19, 1973.

"Screening Cancer Drugs", Science, vol. 184, p. 971, May 31, 1974.

"Plant Medicine", Family Circle, pp. 98-103, Oct. 1972.

"Environmental Search for the Source of Cancer", Saturday Review World, pp. 50-51, April 20, 1974.

Periodicals (Cont'd.)

National Cancer Program

"Cancer Cure - The National Cancer Program", *New Republic*, vol. 165, pp. 11-12, July 17, 1971.

"Politics of Cancer", *Harper*, vol. 243, p. 100, Nov. 1971.

"Politics of Cancer", *Nation*, vol. 213, p. 549, Nov. 29, 1971.

"Politics of Cancer", *Time*, vol. 98, pp. 40-41, July 5, 1971.

"Combatting the Crab - National Cancer Institute Report", *Time*, vol. 100, p. 93, Oct. 9, 1972.

"The Delaney Clause: Should It Be Changed", *Preventive Medicine*, 2: 123-70, 1973.

"How Goes the 'War on Cancer'?", *Saturday Review World*, pp. 50-52, May 18, 1974.

Cervical Cancer

"Cancer of the Cervix", *Redbook*, vol. 138, p. 36, Nov. 1971.

"Guarding Against Cervical Cancer", *Redbook*, vol. 143, p. 62, Sept. 1974.

"Brink of Tragedy", *Good Housekeeping*, pp. 85-155, July 1974.

"The Cancer Women Can Detect", *Family Health*, pp. 26-49, March, 1974.

Radiation and Radiotherapy

"X-ray Fallout" (thyroid cancer), *Newsweek*, vol. 81, p. 49, April 30, 1973.

"Atom Bomb Still Takes Its Toll", *Saturday Review*, vol. 55, pp. 18-19, July 22, 1972.

"I've Learned to Live with Cancer" (radiotherapy), *Seventeen*, vol. 29, p. 138, May 1970.

"Rising Dangers of Atomic Waste", *U.S. News*, vol. 75, pp. 30-32, Sept. 10, 1973.

"Yes, You Can Survive Cancer", *Woman's Day*, pp. 74-146, Oct. 1974.

Periodicals (Cont'd.)

Skin Cancer

"How to Handle the Summer Sun", Reader's Digest, vol. 199, pp. 106-108, July 1971.

"Bask - Don't Burn", New York Times Magazine, July 7, 1974, p. 12.

"Flourides in the Air", Environment, vol. 15, pp. 25-32, April 1973.

"Sunlight and the SST", Saturday Review Science, vol. 11, p. 81, April 1973.

Smoking and Lung Cancer

"Smoking and Cancer in Dogs", Time, vol. 95, p. 48, Feb. 16, 1970.

"Women and Lung Cancer", Newsweek, vol. 79, p. 67, Jan. 10, 1972.

"A Reporter at Large. Smoking Still", The New Yorker, pp. 121-148, Nov. 18, 1974.

"The Rise of Cancer in Black Men", Ebony, pp. 92-100, July, 1974.

Other

"The Effect of Maternal DES Ingestion on the Female Genital Tract", Arthur L. Herbst, Hospital Practice, October, 1975.

"Immunotherapy of Cancer - The Skin Is Deep Enough", Robert C. East, Jr., M.D., and Herbert J. Rapp, Sc.D., Modern Medicine, November 1, 1975.

"Science, Politics, and a Safe Food Supply", E. M. Foster, Ph.D., Journal of the American Veterinary Medical Association, vol. 163, November 1, 1973.

"FDRL Investigation of Cyclamates", Human Pathology, 6 (1): 130-132, January 1975.

APPENDIX C

BOOKS

Materials cited in these appendixes should be evaluated by the teacher prior to use with the students. The following bookd have not been evaluated:

Man Against Cancer. Berenblum, I. (Baltimore, The John Hopkins Press, 1952) Written for laymen - survey of the past, present, and future of cancer treatment and research.

The Truth About Cancer. Cameron, Charles S. (Englewood Cliffs, N.J., Prentice-Hall, 1956) General reader - discusses whole field of cancer - more detailed accounts of the various kinds of cancer (illustrated).

Cancer and the Atomic Age. (New York, Vantage Press, 1958) Survey of cancer more deeply into scientific background of disease and treatment, particularly radiation as cause and cure.

Krebiozen - Key to Cancer? Bailey, H.K. (New York, Ivan Abelersky, Inc., 1963) A dangerously persuasive document which attempts to "prove" that Krebiozen was not quack medicine.

Krebiozen: The Great Cancer Mystery. Stoddard, G.D. (Boston, Beason Press, 1955) Anti-Krebiozen report.

Science and Cancer. Shimkin, M.B. (Public Health Service Publication #162 - Washington, D.C., U.S. Government Printing Office, 1964) A brief introduction to the scientific aspects of cancerous diseases - written for the layman.

The Cancer Story. (DHEW Public Health Service #1162-B) A brief look at science and cancer.

Clinical Oncology - A Manual for Students and Doctors. (Springer-Verlag, New York, 1973).

Cancer Experiments and Concepts. R. Suss, V. Kinzel, J.D. Schribner (Springer-Verlag, New York, 1973).

The Cancerous Disease. Moore, George E. (Wadsworth Publishing Company, Inc., Belmont, California, 1970).

Our Precious Habitat. Bernarade, M.A. (W.W. Norton, Co., New York, NY, 1970) Threats to health within our environment. Chemicals in food, insecticides, and animal diseases, air and water pollution.

Air and Water Pollution. Lunwald, Jerald and Popkin, Jerald (Union Square Press, New York) A book of readings on the deadly menace to our lives and environment.

Dangerous Air. Kavaler, Lucy (John Day Co., New York, N.Y., 1967) Tells about the dangers of air pollution to environment and to humans. List sources of air pollution and the effects they produce.

Smoking and Its Effect on Health. (World Health Organization, Geneva, 1975) Report of a WHO expert committee, WHO Technical Report No. 568. Effects of smoking and recommendations on educational approaches.

Expendable Americans. Brodeur, Paul (New York, The Vikiy Press, 1974) An expose of how dangerous working conditions in the asbestos industry were allowed to go unchecked, thus causing asbestosis and cancer in some workers.

Early Detection: Breast Cancer Is Curable. Strax, Philip, M.D. (New York, Harper and Row, 1974) A highly readable book summarizing much of what is known about breast cancer.

Understanding Cancer. Brooke, Bryan N. (New York, Holt, Rinehart and Winston, 1973). Written for the layman.

The Topic of Cancer. Pilgrim, Ira (New York, Thomas Y. Crowell Co., 1974). Written for layman by a cancer scientist, this book deals with research, diagnosis and treatment, and the politics of cancer.

Eric. Lund, Doris (Philadelphia, J. B. Lippincott Co., Philadelphia, 1973) A mother tells of her son's indomitable spirit during his long battle with leukemia.

APPENDIX D

GOVERNMENTAL AGENCIES

Consumer Products Safety Commission
5401 Westbard Avenue
Washington, D. C. 20207

Department of Labor
Occupational Safety & Health Administration
Washington, D. C. 20210

Environmental Protection Agency
401 M Street, S.W.
Washington, D. C. 20460

Food and Drug Administration
200 C Street, S.E.
Washington, D. C. 20204

National Clearinghouse for Smoking and Health
Center for Disease Control
Atlanta, Georgia 30333

Office of Cancer Communications
National Cancer Institute
Bethesda, Maryland 20014

Roswell Park Memorial Institute*
New York State Department of Health
666 Elm Street
Buffalo, New York 14263

---

*Questions regarding cancer and cancer research will be answered by calling: (716) 845-2300.

APPENDIX E

RESOURCES AND CODE

ACS - American Cancer Society
Contact your local county unit.
All ACS pamphlets and teaching aids
are available free of charge. Films are
available on free loan.

ALA - American Lung Association
1740 Broadway or local unit
New York, New York 10019

CF - Carousel Films, Inc.
1501 Broadway
New York, New York 10036

DHEW - Department of Health, Education & Welfare
U.S. Government Printing Office
Washington, D. C.

EA - Educational Activities, Inc.
Freeport, New York

EBEC - Encyclopedia Britannica Education Corp.
425 N. Michigan Avenue
Chicago, Illinois 60611

FRS - Film Rental Service
Syracuse University
1455 East Colvin Street
Syracuse, New York 13210

HFC - Handel Film Corporation
6926 Melrose Avenue
Hollywood, California 90038

IUAV - Indiana University
A/V Center
Bloomington, Indiana 47401

JHO - Jim Handy Organization
2781 East Grand Boulevard
Detroit, Michigan 48211

KQED - KQED-TV
525 4th Street
San Francisco, California 94107

LP - Lawren Productions, Inc.
4233 Wooster Avenue
San Mateo, California 94403

MCF - Michigan Cancer Foundation
4811 John R Street
Detroit, Michigan 48201

MHT - McGraw Hill Textfilms
330 W. 42nd Street
New York, New York 10018

MLI - Metropolitan Life Insurance Company
Health and Welfare Division
1 Madison Avenue
New York, New York 10010

NCI/OCC - National Cancer Institute
Office of Cancer Communications
Bethesda, Maryland 20014

NYSDH - Film Library Supervisor
Office of Public Health Education
New York State Department of Health
84 Holland Avenue
Albany, New York 12208

Trainex - Trainex Corporation
P. O. Box 116
Garden Grove, California 92642

WHO - World Health Organization
Q Corporation
49 Sheridan Avenue
Albany, New York 12210

USC - University of Southern California
Department of Cinema
University Park
Los Angeles, California 90007

USDA - United States Department of Agriculture
Office of Motion Pictures
Washington, D. C.

APPENDIX F

PAMPHLETS *

Materials cited in these appendixes should be evaluated by the teachers prior to use with students. The following articles have not been evaluated. Students should be referred to the Reader's Guide to Periodical Literature for additional titles.

Smoking and Health

Educational Curriculum on Smoking and Health - RPMI

The Beleaguered Lung - Cancer Invades

Danger - Cigarettes

The Decision Is Yours

If You Want To Give Up Cigarettes

Cancer of the Lung

Answering the Most Often Asked Questions About Cigarette Smoking and Lung Cancer

Tobacco and Your Health

The Dangers of Smoking - The Benefits of Quitting

Facts: Smoking and Health - DHEW CDC #75-8717

Listen Smokers - DHEW CDC #75-8731

Smoker's Self-Testing Kit - DHEW #74-8716

Progress Against Cancer of the Larynx
(NCI) DHEW NIH #75-448

Teenage Self-Test - DHEW CDC #74-8723

Progress Against Cancer of the Lung
(NCI) DHEW NIH #75-526

Youth: Smoking and Health

The Story of a Cigarette Coloring Book

Huff & Puff

Uterine Cancer

Stay Healthy! Learn About Uterine Cancer

Cancer of the Uterus

We Can Conquer Uterine Cancer - Public Affair Pamphlet #432

Progress Against Cancer of the Uterus
(NCI) DHEW #75-171

Colon and Rectal Cancer

Procto - Saves: Worry, Suffering, Lives

Cancer of the Colon and Rectum

Progress Against Cancer of the Colon and Rectum
(NCI) DHEW NIH #75-95

Oral Cancer

Open Wide

Cancer of the Mouth

Cancer of the Larynx

*All pamphlets not specifically designated as NCI, DHEW, etc., are available through your local unit of the ACS.

Progress Against Cancer of the Mouth
(NCI) DHEW NIH #75-118

Breast Cancer

A Breast Check - Life is so Precious, Protect It!

Cancer of the Breast, ACS #2003

Progress Against Cancer of the Breast
(NCI) DHEW NIH #75-328

How to Examine Your Breasts, ACS #2088

Prostatic Cancer

Cancer of the Prostate, ACS #2654

Progress Against Cancer of the Prostate
(NCI) DHEW NIH #75-528

Stomach Cancer

Cancer of the Stomach, ACS #2655

Progress Against Cancer of the Stomach
(NCI) DHEW NIH #75-527

Hodgkin's Disease

Progress Against Hodgkin's Disease - DHEW NIH #72-172

Hodgkin's Disease, ACS #2092

Skin Cancer

Sense in the Sun, ACS #2611

Cancer of the Skin, ACS #2049

Progress Against Cancer of the Skin
(NCI) DHEW NIH #75-310

Bladder Cancer

Progress Against Cancer of the Bladder
(NCI) DHEW NIH #75-722

Bone Cancer

Progress Against Cancer of the Bone
(NCI) DHEW NIH #75-721

Leukemia

Leukemia, ACS #2629

Progress Against Leukemias, Lymphomas and Multiple Myeloma
(NCI) DHEW NIH #75-329

General Cancer Information

Cancer Facts for Men, ACS #2008

Being a Women, ACS #2674

Cancer Facts for Women, ACS #2007

Every Day That You Live, ACS #2045

When a Woman Smokes, ACS #2051

You're Young, You're Female, and You Smoke - DHEW CDC #74-8737

I Have a Secret Cure for Cancer!, ACS #2095

Answering Your Questions About
Cancer, ACS #2025

The Hopeful Side of Cancer, ACS #2012

Safeguards Against Cancer, ACS #2060, 2066, 2073 (Spanish)

Youth Looks at Cancer, ACS #2044

Can We Conquer Cancer? - Public
Affairs Pamphlet #496

Why Learn About Cancer?, ACS #2031

Teacher, Please Call Us!, ACS #2020

APPENDIX G

FILMS

Grades 4-6

Materials cited in these appendixes should be evaluated by the teachers prior to use with the students. The following films have not been evaluated:

GENERAL CANCER INFORMATION

Health Heroes - A Series MLI

Presents the stories of various people who have contributed to fight against cancer.

SKIN CANCER

Sense in the Sun 14 min. ACS (2331, Spanish 2331.19) NYSDH

The basic facts concerning skin cancer - particularly that it is usually caused by excessive exposure to rays of the sun are discussed. Also, when detected early, this is the most curable form of cancer.

SCIENCE

From One Cell 13 min. ACS (2348), NYSDH

Designed primarily for biology class use. Brings the complete subject of embryonic regenerative, and degenerative cell behavior to life. This picture is distinguished by timelapse sequences, showing highly magnified specimens of normal and abnormal living tissue.

The Cell: Structural Unit of Life 15 min Coronet

This film discusses the basic physical structures of plant and animal cells; cell wall, membrane, nucleus, protoplasm, and differentiation. An elementary treatment.

The First Mile Up 25 min. NYSDH

Discusses various factors involved in air pollution. Interviews and comments from health and engineering authorities.

SMOKING AND HEALTH

As We See It 25 min NYSDH, ALA

Some youngsters determined to woo their parents away from smoking produce their own television documentary including interviews with experts.

Breaking the Habit   5 min. NYSDH

Simple but clever cartoon of two characters discussing breaking the smoking habit.

Huffless Puffless Dragon   (Animated) 8 min. (ACS 2381, T,F) NYSDH

This film has humor and satire to emphasize health hazards of cigarette smoking. The good guy (non-smoker), Drag Knight, vs. the bad guy (smoker), Drag Goon, engage in certain contests to determine the superior dragon.

Our Wonderful Body: How We Breathe   11 min. NYSDH

A life-size model of a lung and some simple demonstrations help a young boy learn about breathing. He learns how his diaphragm moves, how his body uses oxygen, how his body gets rid of carbon dioxide, how his breathing rate changes, and ways to help his lungs stay healthy.

Smoking: Past and Present   15 min. ACS (2365, T,F) NYSDH

Reviews the history of tobacco and how it has been used by man from earliest records. Traces the development of evidence leading to present knowledge of health hazards related to the use of tobacco. Designed for use with upper elementary and junior high students. (Teacher's guide available ACS #2660).

Take Joy   10 min. ACS (2340), NYSDH

This film emphasizes the establishment of good health habits to students. The film is accompanied by an extensive teacher's guide which explains various systems of the body, an essential part of the film. For primary use in grades five through seven. (Teacher's Guide ACS #2056).

Smoking Simulator ACS (2732)

A device useful for showing the production of tars from a burning cigarette.

Portfolio of 22 Display Photographs   OCC

Illustrates cancer research experiments, equipment and facilities. Useful for bulletin board display.

FILMS

Grades 7-9

GENERAL CANCER INFORMATION

Cancer 29 min. KQED 1960

Explains how viruses can cause cancers in animals and why it is believed they may be responsible for cancer in humans.

Cancer - Life Against Itself 15 min. MCF 1963

Explains the nature of cancer by demonstrating the behavior of normal and abnormal cells.

Drugs for Cancer 29 min. DCUP 1964

Studies the various drug treatments for cancer, contrasting the quack remedies with the actual anti-cancer medicines.

Nature of Cancer ACS (2059.01)

Teaching aid science classes Jr. High School - 2 lessons: What is cancer? What is relationship between smoking and cancer? Package provides ditto masters, overhead transparencies, and suggested activities for classroom.

Signals 3:30 min ACS (2376, T,F)

A film designed to emphasize dramatically the life-saving potential of cancer's warning signals. It illustrates with unusual photography how a human being constantly obeys the body's signals. For all groups.

ENVIRONMENT

It's the Only Air We've Got 25 min. (#M-1431-X) USDHEW

Describes Pittsburgh's continuing fight against air pollution. Economic and esthetic effect of dirty air as well as health hazards.

Respiration in Man 26 min. FRS 1970

Explains structure and function of respiratory system. Raises the problems of air pollution and how long it can be tolerated by man.

Air Pollution and You 35 min. (#F-1528-X) USDHEW

Outlines basic problems of air pollution, its principle effects on health and property.

Our Poisoned Air 58 min. CDC

Answers: What is air pollution? What does it do to us and our environment? What is being done to control air pollution? What further action is required?

Biography of the Unborn 16 min. EBEC 1963

Shows photomicrographs of conception and cell division in early pregnancy and development of fetus month by month.

Radiation in Perspective 43 min. USDA

Beneficial uses of radioactive materials, medicine, research, industry and other fields are explored and health hazards of radiation are explained.

The First Mile Up 25 min. NYSDH

Discusses various factors involved in air pollution. Interviews and comments from health and engineering authorities.

SCIENCE

Atomic Drugs 29 min. USC 1964

Explains the use of radioisotopes in the diagnosis and treatment of disease.

From One Cell 13 min. ACS (2348)

Designed strictly for biology class use. Brings the complete subject of embryonic, regenerative, and degenerative cell behavior to life. The picture is distinguished by time-lapse sequences, showing highly magnified specimens of normal and abnormal living tissue, which are unique in a teaching film.

How a Virus Kills 29 min. IUAV 1960

Shows how a virus enters a cell, stops its normal functions and reproduces more viruses. Tells how the new viruses escape to infect other cells. Concludes with a discussion of possible methods of controlling viral disease.

Search for Cancer Viruses 30 min. IUAV 1967

Describes the nature and the importance of recent experiments which have implicated viruses as the cause of leukemia. Shows characteristics of healthy cells, cancerous cells and viruses.

The Embattled Cell 21:30 min. ACS (2397)

Shows the actual behavior of living cells - both normal and cancerous - within the human lung. In time-lapse photography the viewer sees the struggle of the body's defensive cells against individual cells, the cleansing mechanism of the lung in action, and the lung's blood supply and drainage systems. For for use with high school science students. (Reference folder - AC 2661)

What Science Knows About Cancer OCC

Pictures elementary principles of cancer research. Suitable for junior high and younger high school students.

Portfolio of 22 Display Photographs OCC

Illustrates cancer research experiments, equipment and facilities. Useful for bulletin board display.

SKIN CANCER

Sense in the Sun 14 min. ACS (2331)

The basic facts concerning skin cancer - particularly that it is usually caused by excessive exposure to rays of the sun - are presented. Also when detected early, this is the most curable form of cancer.

SMOKING AND HEALTH

A Breath of Air 21 min. ACS (2361, T,F) NYSDH

Presents to students a summary of biological and other evidence on the health hazards of smoking. Using certain live-action scenes, animation.

microphotography, the film strives to teach a lesson by using common sense and logical judgement concerning smoking. (Teacher's Guide ACS 2659)

A Message From William Talman 6:45 min. ACS (7268.07)

William Talman, who appeared as the district attorney on the "Perry Mason" show, knew he had incurable lung cancer before he died on August 30, 1968, and he arranged a special legacy - a personal message to the people of this country.

Breaking the Habit 5 min. NYSDH

Simple but clever cartoon of two characters discussing breaking the smoking habit.

Decision for Mike 14 min. ACS (2353, T,F)

This film takes us on a visit with Mike on the big day when he is confronted with the facts on smoking, and tries to make his momentous decision. This unusually different film, satirical in part, deals with the consequences of cigarette smoking. Its primary use is intended for junior and senior high school students. (Teacher's Guide ACS 2010)

Emphysema, The Fact 15 min. ALA 1973

Views the impact of this lung disease: Its major cause - smoking - and approaches to prevention and treatment.

Getting Through 20 1/2 minute NYSDH

Burt Lancaster presents some of the troublesome questions about cigarette smoking. It explores cigarette smoking as a complex paradox in our society and concludes that the final decision about smoking is not up to parents, teachers, the government, medical science, or the advertising business. It is ultimately a personal decision which each teenager must make after carefully weighing the facts.

Healthy Lungs 11 min. NYSDH

Knowledge of the structure and work of the lungs helps to protect them from infection. Also shows the windpipe, larynx, bronchial tubes, small air tubes and air sacs, and animation demonstrates how the exchange of waste products for oxygen takes place.

Point of View 19 min. NYSDH

A fast moving satire. A series of hilarious sequences (interspersed with a few serious moments) designed to make cigarette smoking a subject of ridicule instead of an open-sesame to glamour, good-fellowship and adulthood.

Smoking: Past and Present 15 min. ACS (2365, T,F) NYSDH

Reviews the history of tobacco and how it has been used by man from earliest records. Traces the development of evidence leading to present knowledge of health hazards related to the use of tobacco. Designed for use with upper elementary and junior high students. (Teacher's guide available ACS 2660)

Too Tough to Care 18 min. NYSDH

With satire and jest, this film shows teenagers that cigarette companies are supposedly offering money, prestige, power, sex, identity, sophistication and glamour - while in truth, they are being offered serious illness instead.

To Smoke or Not to Smoke (Filmstrip Kit) 15 min. ACS (2387)

This filmstrip addresses itself to teenagers in junior high and stresses that each student must decide his or her own individual answer to the question. Use grades seven through nine.

Smoking Machine ACS (2732)

A device useful for showing the production of tars from a burning cigarette.

UTERINE CANCER

The Odyssey of Dr. Pap 28:50 min. ACS (2364)

The film tells the story of Dr. George Papanicolaou, the founder of exfoliative cytology and the Pap Test for uterine cancer. His life from childhood to lecturer and research in the U.S. is intermittently described with personal accounts from colleagues. It expresses the courageous spirit of Dr. Pap as he devoted his life to research in his quest to gain the proper recognition of the Pap Test.

Time Out for Life 9:30 min. ACS (2372)

Film on the Pap Test for low-income audiences. The narrator tells the problems faced by women to have a Pap Test then relates the actual story of a mother who, after being informed about the test, takes the test which is found to be positive. She is successfully treated and she is seen functioning normally in all aspects of her life.

For a Wonderful Life 10 min. ACS (2342)

Film on Pap Test narrated by Lucille Ball and her daughter. Well done.

FILMS

Grades 10-12

BREAST CANCER

Breast Cancer: Where We Are 28 min. ACS (2332)

This film gives the women of America vital information on how to protect themselves against cancer of the breast. Narrated by actress Jennifer O'Neill, it explains the contributions that mammography and thermography are making toward early detection of breast cancer. The film also explains the positive role that "Reach to Recovery" volunteers play in rehabilitation.

Marvella Bayh Story 10 min. ACS (7265)

The film captures Mrs. Bayh's warmth and vitality as she tells how she faced breast cancer and then returned to a full, busy and productive life. This film features her husband, Senator Birch Bayh.

Something Very Special 12 min. ACS (2341, 16, T,F) 1975

Designed to instruct senior high school girls in breast self-examination and the Pap Test. With Teacher's guide - recommended.

How To Examine Your Breasts 6:30 min. ACS (16,T,F,S) 1975

Basic procedures of BSE.

COLON AND RECTAL

On With Your Life 12 min. ACS (2350, T,F)

Primary theme of this film is on health checkups with emphasis on the proctosigmoidoscopic examination. This fast paced film cuts back and forth from "Mission: Impossible" scenes and features Peter Graves and others from the cast.

ENVIRONMENT

It's the Only Air We've Got 25 min. (#M-1431-X USDHEW

Describes Pittsburgh's continuing fight against air pollution. Economic and esthetic effect of dirty air as well as health hazards are covered.

Respiration in Man 26 min. FRS (#3-8267) 1970

Explains structure and function of respiratory system. Raises the problems of air pollution and how long it can be tolerated by man.

The First Mile Up 25 min.

Discusses various factors involved in air pollution. Interviews and comments from health and engineering authorities.

The Waters Around Us 25 min. NYSDH

Documentary dealing with the problem of water pollution as it affects NYC.

GENERAL CANCER INFORMATION

Cancer Challenge to Youth (Filmstrip Kit) 15 min. ACS (2324)

Presents the basic story of cancer - the nature and history of cancer as a disease and major health program, normal and abnormal cell behavior, diagnosis and treatment. It emphasizes the importance of individual responsibility for self protection. Use: Junior and senior high science and health classes.

Cancer - Life Against Itself 15 min. MCF 1963

Explains the nature of cancer by demonstrating the behavior of normal and abnormal cells.

Drugs for Cancer 29 min. DCUP 1964

Studies the various drug treatments for cancer, contrasting the quack remedies with the actual anti-cancer medicines.

Inside Magoo 12 min. ACS (2399, T,F) 1960

Shows why prompt action in seeking medical attention is a must when cancer is suspected. It tells, through the antics of a cartoon character, what fear can do to prevent common sense action.

Signals 13 min. ACS (2376)

A film designed to emphasize dramatically the life-saving potential of cancer's warning signals. It illustrates with unusual photography how a human being constantly obeys the body's signals.

Man Alive   12 min.   ACS (2329, T,F - Spanish 2339)

A general purpose animated film, designed to stimulate interest and to influence attitude toward cancer. It deals primarily with the psychology of fear as it relates to cancer.

Lyn Helton Story   9 min.   ACS (5558)

An extremely poignant film depicting the struggle of Lyn Helton in her fight with cancer. It is narrated by Lyn and photographed by her husband. She died shortly after the film was completed. A moving story for all groups, especially high school age.

Michael and Me   13 min.   ACS (7266) (16)

This film deals with Michael Finamore, now 23 years old, who at the age of 12 contracted leukemia.

QUACKERY

Journey Into Darkness   30 min.   ACS (2370)

The film vividly exposes cancer quackery. It is narrated by Robert Ryan, noted actor. The main setting of the film is a busy metropolitan airport, and deals with a group of average persons who have one thing in common: they are involved with cancer quacks. The factors which lead cancer victims to cancer quacks are presented. Ryan stresses how to avoid the pitfalls of cancer quackery and the good chances of recovery for cancer patients when they seek treatment in time from reputable physicians.

RESEARCH

Investment in Life   29.30 min.   ACS (5632)

Graphically and dramatically outlines the latest ACS research work. Leading researchers tell their stories in the quest to discover a way to control, and ultimately, to conquer cancer.

In a Medical Laboratory   28 min.   ACS (2362)

Directs attention to the wide choice of careers in medical laboratories - pathologists, medical technologists, cytotechnologists, histologic technicians, and the classification of Certified Laboratory Assistant. The cases of three hospital patients and the laboratory procedures used in diagnosis and treatment are dramatized.

SCIENCE

Atomic Biology for Medicine   13 min.   HFC 1956

Explains various research experiments in biomedicine using atomic energy as an effective tool.

Atomic Drugs 29 min. USC 1964

Explains the use of radioisotopes in the diagnosis and treatment of disease.

Biology Aids - Six Silent Super 8 Cartridges for High School

These silent loops provide excellent background material for biology study dealing with early reproduction stages, abnormal cell behavior, the cell, DNA and RNA. These biological aids are released on a loan basis only.

Cracking the Code of Life 22 min. ACS (2395, T,F)

Tells the story of DNA (Deoxyribonucleic Acid) by means of imaginative animation, live classroom scenes, and dramatic use of a large DNA model. In relating DNA to the greatest mystery of all, the nature of life itself, the film explains how information on heredity is passed along and growth controlled. For use with high school and college science classes. (Film Guide ACS 2647).

From One Cell 13 min. ACS (2348)

Designed strictly for biology class use. Brings the complete subject of embryonic, regenerative, and degenerative cell behavior to life. The picture is distinguished by time-lapse sequences, showing highly magnified specimens of normal and abnorml living tissue. (Study Gude ACS 2002)

How a Virus Kills 29 min. IUAV 1960

Shows how a virus enters a cell, stops its normal functions and reproduces more viruses. Tells how the new viruses escape to infect other cells. Concludes with a discussion of possible methods of controlling viral disease.

The Human Body: Respiratory System 1-:30 min. NYSDH

The location and functions of the respiratory organs are shown. Through animation and live demonstration the mechanics of ventilation and the physics of diffusion between alveoli and capillaries are shown. We see the effect on the respiratory system of varying needs for oxygen, and the function of the respiratory system in providing needed oxygen and eliminating carbon dioxide.

Nature of Cancer ACS (2059.02)

Teaching aid for science classes - senior high school. 8 lessons: What is cancer? What is connection between viruses and cancer? Hydrocarbon chain compounds nitrogen cycle, normal lung, what is the connection among cancer, heredity and environment? How is cancer treated? How may cancer by controlled? Each lesson contains student activities, transparancies, review tests, vocabulary/ answer sheets (ditto masters provided where appropriate).

Pathophysiology of Cancer Trainex (PC-274

The filmstrip program begins with graphic illustrations of the normal cell, its growth and development. It proceeds to illustrations of the growth and development of the malignant cell, including discussions of the irregularity of malignant cell growth, immature and anaplastic cells, and mitotic variations of the cell. The second half of the program deals with the spread of cancer, its routes of metastasis and causative factors, and concludes with a discussion of the effects of cancer upon the individual. (Includes instructor's guide.)

Search for Cancer Viruses 30 min. IUAV 1967

Describes the nature and the importance of recent experiments which have implicated viruses as the cause of leukemia. Shows characteristics of healthy cells, cancerous cells and viruses.

The Embattled Cell 21:30 min. ACS (2397, T,F)

Shows the actual behavior of living cells - both normal and cancerous - within the human lung. In time-lapse photography the viewer sees the struggle of the body's defensive cells against individual cells, the cleansing mechanism of the lung in action, and the lung's blood supply and drainage systems. For use with high school students, especially science students.

SKIN CANCER

Sense in the Sun 14 min. ACS (2331, Spanish 2331.19)

The basic facts concerning skin cancer - particularly that it is usually caused by excessive exposure to rays of the sun are presented. Also, when detected early, this is the most curable form of cancer.

SMOKING AND HEALTH

A Breath of Air 21 min. ACS (2361, T,F) NYSDH

Presents to students a summary of biological and other evidence on the health hazards of cigarette smoking. Using live-action scenes, animation, microphotography, still-photos and charts, the film strives to teach a lesson by appealing to youngsters to use their common sense and logical judgment concerning smoking. (Teacher's guide available ACS #2659.)

Decision for Mike 14 min. ACS (2353, T,F)

This film takes us on a visit with Mike on the big day when he is confronted with the facts on smoking, and tries to make his momentous decision. This unusually different film, satirical in part, deals primarily with the consequences of cigarette smoking. (Teacher's guide available ACS #2010.)

Emphysema, The Facts   15 min.   ALA 1973

Views the impact of this lung disease; its major cause - smoking - and approaches to prevention and treatment.

Smoking - Let's Call It Quits   30 min.   #5631 (16)

This film features the star of "Happy Days", Tom Bosley. It is a fresh new approach to helping people quit smoking and successfully uses a sense of humor instead of preaching or scare tactics.

Getting Through   20½ min.   NYSDH

Burt Lancaster presents some of the troublesome questions about cigarette smoking. It explores cigarette smoking as a complex paradox in our society and concludes that the final dicision about smoking is not up to their parents, their teachers, the government, medical science, or the advertising business. It is ultimately a personal decision which each teenager must make after carefully weighing the facts.

Is Smoking Worth It?   16 min.   NYSDH

This film presents facts about the relationship between cigarette smoking and lung cancer. Graphs, chemical tests on smoking machines and laboratory tests on mice are used to demonstrate the smoking-lung cancer relationship. A discussion among teenagers on their attitudes toward smoking is presented. The adult side of the smoking problem is discussed by a clinical psychologist and two persons who tried to give up smoking - unsuccessfully.

Smoking and Lung Cancer   29 min,   NYSDH

Showing a lung operation, this film stimulates viewer to consider seriously the hazards of smoking.

The Time To Stop Is Now   (Animated)   4:30 min.   ACS (2369, T, F)

This short, hard-hitting film presents the evidence supporting the relationship between smoking and cancer. Stressed are beneficial effects of stopping cigarette smoking as related to lung cancer, heart attack, and emphysema.

Who, Me?

The film emphasizes the two-fold risk adults take when they smoke cigarettes: Danger to their own health, and the encouragement their example gives to youth to smoke. While a light and non-preaching film treatment is used, key facts about the risks of cigarette smoking are presented in vivid fashion.

UTERINE CANCER

It's Up to You   13 min. ACS (2369, T,F)

Portrays a real-life community situation in which viewers are taken along with a group of women to a lecture by a physician on uterine cancer. The Pap Test is illustrated and explained by use of a plastic anatomical model. For use with women and senior high school girls.

The Odyssey of Dr. Pap   28:50 min. ACS (2364)

The film tells the story of Dr. George Papanicolaou, the founder of exfoliative cytology and the Pap Test for uterine cancer. His life from childhood to lecturer and research in the U.S. is intermittenly described with personal accounts from colleagues. It expresses the courageous spirit of "Dr. Pap" as he devoted his life to research in his quest to gain the proper recognition of the Pap Test. Explanation of the Pap Test is made while describing "Dr. Pap's" research.

Time and Two Women   18 min. ACS (2389, T)

Shows how cytology can be used to control cancer of the uterus. The film dramatizes the case histories of two women - one whose cancer was discovered too late and one who was saved because of early detection. For use with women and senior high school girls.

Something Very Special   12 min. ACS (2341, 16, T,F) 1975

Designed to instruct senior high school girls in the Pap Test and breast self-examination. With Teacher's guide -- recommended.

For A Wonderful Life   10 min. ACS

Film on the Pap Test narrated by Lucille Ball and her daughter. Well done.